THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

FEBRUARY, 1903.

DISEASES OF THE PANCREAS.[1]

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The pancreas is situated in the epigastric and left hypochondriac regions, on the body of the first lumbar vertebra, and from its protected position is less liable to injury and also less accessible to surgical manipulation than the other abdominal organs. Ashhurst quotes a table of 868 cases of injury to the solid viscera of the abdomen, of which only 1.5 per cent. were injuries to the pancreas. It is an elongated organ, measuring from 12 to 20 cm. in length, 4 to 5 cm. in width, and weighs from 60 to 100 grammes. It is pinkish in color and soft in texture, and may conveniently be divided into the head, neck, body, and tail.

Glinski has pointed out anomalies of the pancreas due to disturbances during development, and notes several forms of accessory and divided pancreas. An annular deformity, with resulting constricture of the duodenum, has been observed by Tieken.

The pancreas is a racemose gland made up of numerous lobes and lobules held together by a connective tissue framework and closely resembling the parotid gland in its structure. The secreting glands and acini are composed of high columnar cells becoming lower in the smallest ducts and again columnar in the larger ducts, which unite and empty into the pancreatic duct of Wirsung.

Langerhans, in 1869, after a careful study of the pancreas of rabbits, which closely resembles that of other mammals, described groups of cells, irregularly polygonal and having a round nucleus situated in the

[1] Read before the West Penn Medical Society, Pittsburg, November 25, 1902.

parenchyma of the lobules; these are termed the "islands of Langerhans." They are of the same origin as the glandular acini, but are independent of them, and have an intimate relation with the vascular system, the capillaries forming a network with a tortuous course and resembling the glomeruli of the kidney. The "islands" are three and a half times more numerous in the tail of the organ than in other portions, and probably have some special function, imperfectly understood as yet, but probably having some relation to carbohydrate metabolism. Lewaschew claimed that he could increase their number by overstimulation of the gland with repeated injections of pilocarpine and by overfeeding, and that this increase took place at the expense of the acini; but Opie by a series of careful experiments on dogs found that prolonged stimulation does not transform groups of acini into "islands of Langerhans."

The relation of lesions of the pancreas to diabetes is of great interest, and Opie and others have found marked changes in the "islands of Langerhans" in this connection without any alteration in the parenchyma of the gland.

The pancreatic or Wirsung's duct commences near the tail of the pancreas and passes from left to right, becoming larger as it receives the tributaries, and at the neck of the gland turns slightly downward and backward, and unites, near the head of the pancreas, with the common bile-duct, and they together form the ampulla of Vater, which empties by a narrow opening into the posterior surface of the duodenum, about three inches from the stomach. In nearly every instance a second or accessory duct is present—Santorini's duct. This leaves the main duct before its union with the bile-duct, passes behind the latter, and is continued forward into the duodenum, about two inches from the stomach and about one inch above the opening of the diverticulum of Vater. Schirmer in a study of 105 anatomical specimens found that in all but 2 instances some evidence of a second duct was present, and that in 53 per cent. of the cases this accessory duct was capable of draining the pancreas, and at the same time was not subject to stoppage by gallstones. Bünger found an accessory duct in only 10 per cent. of 58 cadavers examined.

The diverticulum of Vater is about 8 mm. in length, conical in shape, with the apex opening into the duodenum on a longitudinal fold of mucous membrane, and the two ducts opening into the base rather nearer the posterior than the anterior wall. Bünger, however, states that in 98 to 99 per cent. of his 58 examinations the two ducts did not unite, but opened at separate points in the duodenum, and that, as a rule, the pancreatic passed beneath the bile-duct.

These anatomical peculiarities are interesting because of the etiology of pancreatitis. Opie makes the following statement in reviewing a

case of Halsted's: "A small gallstone impacted in the diverticulum of Vater may occlude the common orifice of the bile-duct and duct of Wirsung and convert them into a continuous closed channel. Bile enters the pancreas by way of the pancreatic duct, and the pancreas becomes the seat of inflammatory changes characterized by necrosis of the parenchymatous cells, hemorrhage, and the accumulation of inflammatory products. Anatomical peculiarities of the diverticulum of Vater do not permit this sequence of events in all individuals."

The pancreas holds a relation to many important structures, and the severity of the symptoms when it is attacked by disease is undoubtedly due to this relation. The head is in intimate relation to the curving duodenum and to the superior mesenteric vessels, and is crossed by the transverse colon. Sometimes a prolongation reaches the lesser curve of the stomach. The body is in contact with the stomach anteriorly, and with the diaphragmatic crura, vena cava, aorta, superior mesenteric vessels, left kidney, and suprarenal gland posteriorly. It is also in relation with the cœliac axis, solar plexus, and splenic artery. The tail is in contact with the anterior surface of the spleen.

The blood supply of the pancreas is derived from the splenic, hepatic, and superior mesenteric arteries, and is returned into the portal system.

The lymphatics terminate in glands lying on the splenic and superior mesenteric arteries and between the pancreas and spleen and pancreas and duodenum.

Branches from the solar plexus furnish the nerve supply.

The peritoneum is derived from a reflection of the transverse mesocolon.

The secretion from the pancreas is clear, alkaline in reaction, with a specific gravity of about 1030, and contains four ferments, trypsin, amylopsin, steapsin, and a milk-curdling ferment. Steapsin is the fat-splitting ferment and is frequently a factor in the production of fat necrosis. Baker, in 1882, was the first to describe this condition, which has since been investigated by Langerhans, Hildebrand, Flexner, Opie, Korte, and others, and has furnished a fertile field for experimental study. By fat necrosis is meant the action of the pancreatic secretion upon surrounding fat areas and the splitting of this fat into fat acids and glycerin, and the combination of the fatty acids with lime salts with the resulting formation of whitish patches in the omentum, mesentery, and subperitoneal fat, and occasionally in the pericardial or subcutaneous fat as well.

In experimental work fat necrosis has been produced by ligating the pancreatic duct in animals and stimulation of the pancreas by pilocarpine. The animals lived for twenty or thirty days after the operation, thus allowing the pancreatic secretion to penetrate for some distance, and both Opie and Flexner have obtained fat necrosis of the

epicardial fat in this way. Associated with the fat necrosis, hemorrhage of the pancreas has usually been observed, and the action of the glycerin set free has been ascribed as the cause, but proof as yet is wanting.

The pancreas is rarely injured, owing to its protected situation, but this occurs occasionally as the result of blows upon the abdomen or from behind, and gunshot or stab wounds. The late President McKinley was wounded in the pancreas indirectly, and the organ became necrotic in part, though no fat necrosis occurred.

The injury will be followed by rapid onset of shock and early collapse, and, if the pancreas alone is injured, little bleeding follows. The combination of the digesting action of the pancreatic ferments with a bacterial infection from the wound itself necessitates immediate operation and the repair of the injured organ; but in most cases other viscera, like the spleen or liver, are involved, and severe hemorrhage makes the prognosis far from hopeful. Injury of the pancreas which is not so severe as to cause rupture may induce the formation of inflammatory cysts, especially into the lesser peritoneal sac, with the foramen of Winslow closed by inflammatory process. These tumors form with great rapidity. Chronic pancreatitis may follow bruising or result from injury to the pancreas during operations upon the stomach or biliary passages, when, from the difficulty of the operation, the pancreas has been excessively handled; therefore, these operations should be done with the greatest care and gentleness. Prolapse of the pancreas through an abdominal wound is rare, but has been recorded several times. Robson has collected eight such cases from the literature.

In February, 1889, Reginald Fitz, of Boston, delivered the Middleton-Goldsmith Lecture for that year upon the subject of "Acute Pancreatitis." The service he rendered to the medical profession may be judged from the fact that every subsequent writer upon this subject has acknowledged his indebtedness to Fitz for the impetus which that celebrated internist gave to the pathology and treatment of the disease.

Until 1842 the subject of pancreatitis was mostly discussed from a theoretical standpoint, and such views as prevailed associated the diseased pancreas with mercurial poisoning.

Classen, in 1842, collected six cases which he regarded as probable pancreatic disease that had resulted fatally, and described the symptoms of the disease from these cases. As Fitz points out, the correctness of the diagnosis of these cases is very doubtful.

Klebs, Friedrich, and Balser published valuable contributions to the subject, and Balser, in 1882, called attention to the presence of areas of fat necrosis associated with pancreatic disease. Senn, in 1886, published his classical work on the surgery of the pancreas, and in 1889

Fitz accurately described and classified acute pancreatitis, advising palliative treatment in the early stages, and suggesting surgical treatment in the suppurative and gangrenous forms.

In 1895 Birch-Hirschfeld described chronic pancreatitis, and Schlessinger, in 1898, investigated this condition further. In 1900 Mayo Robson, in a lecture before the London Polyclinic, pointed out the surgical importance of chronic pancreatitis, and called attention to the similarity which it bore to cancer of the pancreas.

The etiology of pancreatitis is still obscure. It seems to be a disease of the middle period of life of high-livers, and more especially when a free use of alcohol is indulged in, and in those who have a tendency toward corpulency. Gastroduodenal catarrh, with extension to the duct, and followed by bacterial invasion, may be a factor, and as the duodenum from its contour will aid in the delay of any decomposing food products, this factor should be seriously considered.

Ulcer and cancer of the stomach, pylorus or duodenum and zymotic disease, such as enteric fever, mumps, and influenza, are the determining factors stated by Mayo Robson.

Biliary and pancreatic calculi are certain causes of pancreatitis. The association of gallstones with pancreatic disease has been repeatedly observed and recorded, and the impaction of a stone in the ampulla of Vater at its orifice will cause the penetration of bile into the pancreatic ducts and an acute pancreatitis. This has been observed clinically and produced experimentally.

Pancreatitis may be divided clinically into acute, subacute, and chronic.

Acute pancreatitis is characterized by the sudden onset of pain in the epigastrium, colicky in nature, accompanied by prostration and anxiety. Vomiting is an early symptom, and, as a rule, is severe. Examination of the abdomen reveals a tender swelling in the epigastrium, tympanitic upon percussion. Constipation develops, and is so difficult to overcome that acute intestinal obstruction has frequently been made as the diagnosis. Collapse may rapidly follow, with a distending and rigid abdomen, small, rapid pulse, irregular temperature, delirium, and death. In these cases the pancreas is found to be the seat of an acute cellular or fibrinocellular infiltration of the connective tissue of the organ, with a more or less extensive necrosis of the lobules, and with diffused hemorrhage into the organ; fat necrosis, if present, is not widely distributed; a blood count is useful in determining the amount of hæmoglobin. In the less acute cases life may be prolonged for days, and recovery sometimes occurs.

The diagnosis of acute pancreatitis is attended with difficulty, owing to the obscurity of the symptoms, which are mainly those of acute peritonitis originating in the epigastrium. Intestinal obstruction is

the usual diagnosis made, and in fact the two may coexist, as Robson points out, from strangulation of the duodenum by inflammatory material or by the swollen pancreas itself. The obstruction, however, is not so absolute, and repeated enemas, before peritonitis has supervened, finally restore the peristalsis of the bowel. In favor of intestinal obstruction is the slow pulse, normal or subnormal temperature, the more general and usually greater degree of abdominal distention, inability to stool or pass flatus, vomiting persistent, soon becoming stercoraceous. Palpation of abdominal walls excites storms of pain. In favor of pancreatic disease is the history of previous attacks. In perforating gastric or duodenal ulcer the tenderness to pressure is not so acute, and there is less muscular rigidity in the early stages. The early bowel paresis will raise the lower border of liver dulness in ulcer, and there are also the premonitory symptoms of gastric pain associated with taking food, the occasional vomiting of blood if the stomach or the first portion of the duodenum be the seat of the ulcer, black stools, if the ulcer be in the lower portion of the duodenum, and the chlorotic tendency.

In cholecystitis the pain is never as severe, and is located over the gall-bladder, radiating to the right shoulder, breast or back, while in pancreatitis, if radiation occurs, it tends to go toward the left. There is usually a history of enteric fever and gallstone attacks. Rigidity is less general and early distention seldom present.

Acute ptomaïne poisoning may resemble pancreatitis, but the more general nature of the colic, the constant diarrhœa, and the previous history should decide the diagnosis.

The treatment of pancreatitis is still open to discussion. Many of the milder cases recover without operation, but, on the other hand, the majority of the severe acute cases rapidly collapse, and may die without a diagnosis having been made. Definite rules for treatment cannot be laid down, but to each case the judgment of the surgeon must be applied.

In the less severe type of cases the patient should be put at absolute rest, giving sufficient morphine to quiet the pain, which is always very severe, combating depression by the use of stimulants, especially enteroclysis, combining whiskey with the salt solution. The vomiting may be relieved by lavage and rectal feeding, and for the feeling of oppression in the epigastrium hot fomentations or turpentine stupes may be applied.

In cases which are more severe the abdomen may be opened and gauze drainage introduced. The hemorrhagic form of pancreatitis may be accompanied by necrosis and disintegration of gland tissue, and such conditions are best treated by a free incision and gauze drainage. In this form of pancreatitis the anæmic condition of the patient, as in extra-uterine hemorrhage, may be marked.

In the very severe cases the extreme shock will contraindicate operation and require every possible stimulation to save the life of the patient. Death is often a matter of hours from the onset of the initial acute symptoms.

The following cases occurred during the past two years at the German Hospital:

Mrs. C. S., aged twenty-seven years. Family history of tuberculosis. Previous history negative, except for habitual constipation and the free use of alcohol of recent years. Three weeks before admission the patient was exposed to cold and wet, and became acutely jaundiced, with pain across the back, and nausea and vomiting. It lasted a few days and she then improved. This was probably an attack of alcoholic gastroduodenitis. The jaundice subsided. Eight days before admission she was suddenly seized with pain throughout the abdomen, most marked on the right side, high up. No vomiting, but bowels were constipated. The pain continued until her admission to the German Hospital.

On admission the patient was anæmic-looking, with yellow scleræ. Temperature of 101°; pulse, 120. The abdomen was slightly distended and tender all over, with a point of greatest intensity one inch above and one inch to the right of the umbilicus. Gall-bladder tender, but not enlarged. Spleen was slightly enlarged. No mass could be detected. The X-ray showed the absence of a pathological shadow. The urine contained a trace of albumin, but no sugar or casts. There were 24,400 leucocytes to the cubic millimetre. Vaginal examination negative. On the day after admission she vomited large quantities of a greenish material, and the leucocytes rose to 32,800. Vomiting continued for twenty-four hours, and was then relieved by gastric lavage.

Six days after admission she was much better, the abdomen was flat, and no pain or tenderness except an occasional colic about the umbilicus. Leucocytes were still high, 21,600; twelve days after admission she was up and about the room, with a normal temperature and blood count, and no pain of any kind.

Mrs. M. C., aged fifty years. No family or previous personal history was obtained. Patient was admitted to the hospital in a state of collapse, with subnormal temperature, rapid and feeble pulse, cold, clammy skin, and cyanosis.

The abdomen was distended, rigid, and tender throughout, with very intense colicky pain in the epigastrium. Death took place six hours after admission. From her relatives it was elicited that twenty-four hours previous to admission she had been suddenly seized with violent epigastric pain, nausea, vomiting, and diarrhœa. There was no alcoholic history. The woman was quite stout. Post-mortem revealed a diffused fat necrosis of the omentum and mesentery, which in some places had broken down and undergone calcareous degeneration. The pancreas was enlarged and hard, with a hemorrhagic appearance on section. No gallstones were present.

As has been stated, hemorrhage into the pancreas may cause foci of necrosis, and when this process gradually increases, with larger areas

of coagulation, necrosis and sequestration of portions of the gland, the condition of necrosing pancreatitis exists.

Gangrenous and suppurating pancreatitis are due to the invasion of the gland with micro-organisms, and are accompanied, as a rule, by widely disseminated fat necrosis. The gangrenous form is probably a later result of hemorrhagic pancreatitis, and the pancreas may be dry, black, and necrotic.

Suppurative pancreatitis may coexist with the necrotizing form, and is characterized by purulent collections in the parenchyma or interstitial tissue of the gland, with sometimes a general infiltration. Such abscesses may form peripancreatic collections and rupture into the stomach, duodenum, or colon. Thrombus of the portal vein and infection of the liver may follow the extension of infection.

The symptoms of the suppurating and gangrenous forms of pancreatitis are marked by the usual sudden onset, with intense pain, vomiting, and shock, followed by septic symptoms, with, perhaps, delirium. Palpation elicits the most valuable symptom—a tender mass in the epigastrium. The continuance of the symptoms observed in many of these cases allows time for a thorough examination of the stools for fat or evidence of imperfect digestion. The urine may show evidence of glycosuria and, therefore, disease of the islands of Langerhans. The presence of the fat-splitting ferment of the pancreatic juice has not been clearly demonstrated in the urine, and the success of such a test would be a valuable sign in the diagnosis of the disease. Reduction in the amount of ethereal sulphates in the urine is an inconsistent sign of pancreatic disease, but has not been sufficiently tried as yet.

The treatment of the suppurative and gangrenous form of pancreatitis consists in laparotomy, evacuation of pus and drainage of the purulent foci. The following case occurred a few days ago in the German Hospital:

Mr. T., aged fifty-two years. Family history negative. Had ordinary diseases of childhood. Malaria, typhoid fever twenty-six years ago, and rheumatism. Uses alcohol and tobacco moderately. Bowels irregular, and digestion fair, some tendency toward dyspepsia. Twenty-five years ago he had an attack of colicky pain in epigastrium, with vomiting; no jaundice. Lasted twenty-four hours, and the pain during that time was very severe. Has had four attacks similar to this. Three days before admission he had a slight colic in epigastrium, vomiting, dyspeptic symptoms, like belching and nausea, and noticed that his abdomen was distended and the stools clay-colored. On the day before admission had a sharper attack of vomiting of a clear, green, bile-stained material.

On admission the patient is a heavy, stout man, with yellow scleræ, coated tongue, muddy skin, and a distended and tympanitic abdomen. This distention is most marked in the epigastric region, at which local-

ity considerable tenderness could be elicited on palpation. He complained of pain across the lower thorax, which was accentuated by coughing, during which time acute pain was felt over the abdomen. The urine showed the presence of albumin, casts, and bile, but no sugar. The blood indicated an anæmia and 8200 leucocytes. The stools contained free fat. An X-ray gave a shadow dense in character and over the region of the pancreas.

The patient was kept at rest for a week after admission without any change in his symptoms being observed. The temperature remained between 100° and 101° F., the pulse about 90, and respiration at 28.

On the day before operation there were 13,850 leucocytes counted with 81.3 per cent. of the polynuclear type and 18.7 per cent. of the mononuclear type. There were no eosinophiles observed. Vomiting ceased under treatment, but the strength of the patient was rapidly failing, and operation was decided upon. No mass could be felt at any time in the region of the pancreas, but there was a sense of resistance over the gall-bladder and pancreatic regions, with marked tenderness.

Operation under ether anæsthesia, which was administered with difficulty owing to the cyanotic condition of the patient. An incision was made through the left rectus. The omentum was observed to be speckled with areas of fat necrosis, and the epigastrium was the seat of a peritonitis. The gastrocolic omentum was opened with the fingers and the lesser peritoneum found to be full of a chocolate-like material. This was mopped out with sponges and rubber, and gauze drainage passed down to the bottom of the cavity. The patient's condition forbade any further interference, and he was sent back to bed. Death occurred three hours later.

As no autopsy was permitted the operative wound was merely opened and slightly enlarged. Diffused fat necrosis was found in the omentum, mesentery, and peritoneal fat. The meso-appendix and the epiploic appendages were involved. There were many areas of calcareous infiltration, some of which had broken down. On widely opening the gastrocolic and gastrohepatic omenta and raising the stomach the pancreas was found to be necrotic, black, and gangrenous throughout its entirety, with the exception of the head, which, while apparently diseased, was not gangrenous. The entire fat of the lesser peritoneum and adjacent structures, including the peritoneal fat, was in a state of necrosis and mostly liquefaction necrosis. The spleen was slightly enlarged. The gall-bladder was distended and filled with gallstones, many of which were small, and the cystic duct was occluded by a stone. The liver appeared normal. The common duct was free from a stone as far as could be determined, though its course in the pancreas could not be found. The ampulla of Vater was clear. The pancreatic duct could not be made out. No further post-mortem examination could be made. Cultures were taken from the region of disease, and are being studied.

Subacute pancreatitis will present the general symptoms of the more severe type, but in a lessened degree. The onset is more gradual, the pain is less severe, and the vomiting is not so violent. The case is more prolonged and the primary constipation is frequently succeeded by diarrhœa, with pus or blood in the stools. The temperature is more

elevated, as a rule, and the depression is markedly lower. The patient in the fatal cases gradually loses strength and weight, or may show evidences of severe septic poisoning. If an abscess develops, a tender tumor mass may be palpated in the epigastrium.

The treatment of subacute pancreatitis has been described, and will vary with the severity of the symptoms and the presence or absence of suppuration.

Chronic indurative pancreatitis is probably a more common disease than the number of reported cases seems to show, and many of those cases diagnosed as malignant disease of the head of the pancreas are probably of this character.

Opie's conclusions, after a study of twenty-nine cases of chronic pancreatitis, define the present status of the etiology and pathology of the disease:

"1. Chronic interstitial pancreatitis is slightly more frequent in males than in females. Two-thirds of the total number of cases occur between the ages of forty and sixty years. 2. The most frequent cause of chronic pancreatitis is obstruction of the duct of Wirsung, due to pancreatic calculi, to biliary calculi in the terminal part of the common bile-duct, or to carcinoma invading the head or body of the gland. Duct obstruction may be followed by the invasion of bacteria, which take part in the production of the resulting lesion. 3. Ascending infection of the unobstructed duct of Wirsung may follow an acute lesion of the duodenum or of the bile passages, and may cause chronic inflammation. In cases which have given a history of long, persistent vomiting, chronic diffuse pancreatitis may be found at autopsy, and is probably the result of an ascending infection of the gland. 4. General or local tuberculosis is occasionally accompanied by chronic diffuse pancreatitis, affecting chiefly the interstitial tissue of the gland. 5. Chronic interstitial pancreatitis is not infrequently dependent upon the same etiological factors, notably alcohol, which produce cirrhosis of the liver, and in about one-fourth of the cases the two lesions are associated. 6. Following duct obstruction and ascending infection, the lesion affects principally the interlobular tissue, only secondarily invading the lobular tissue and sparing the islands of Langerhans. Diabetes results only when the lesion is far advanced. 7. Accompanying the so-called atrophic or Laennec's cirrhosis of the liver the pancreas is sometimes the seat of diffuse chronic inflammation, characterized by diffuse proliferation of the interacinar tissue, which invades the islands of Langerhans. A similar lesion accompanied hyaline degeneration of the islands of Langerhans and the condition known as hæmochromatosis. 8. Interacinar pancreatitis is usually accompanied by diabetes mellitus. When diabetes is absent the lesion is of such slight intensity that the islands of Langerhans are little implicated."

The diagnosis of this condition is rather difficult to make because of the usual gradual and painless onset. In some cases the initial symptoms resemble those of a gallstone attack, with pain, vomiting, and jaundice. The pain is more in the epigastrium, however, and may be referred to the left side or backward to the midscapular region. The greatest point of tenderness will be found one inch above and one inch to the right of the umbilicus. When the induration of the head of the pancreas is sufficient to obstruct the bile-duct jaundice slowly deepens and becomes chronic. There is usually rigidity of the recti muscles. Asthenia is a constant symptom, and dyspeptic symptoms and frequently diarrhœa will be noted. In the later stages the cachexia, the tumor which may be palpated in the epigastrium, and the enlarged gall-bladder present a picture which is very difficult to diagnose from that of malignant disease.

In all of Mayo Robson's cases numerous adhesions were found around the duodenum, pylorus, and hepatic flexure of the colon, and even occluding the foramen of Winslow and adherent to the gall-bladder and liver.

Later sequelæ may result, such as gastro-ectasis, abscess of the liver, ascites, and intestinal obstruction from the constricting adhesions.

The differential diagnosis must be made from gallstones, malignant disease of the pancreas, liver, and biliary passages, and chronic gastritis.

The diagnosis of gallstones is not very important, as both diseases require a surgical operation.

The previous history of repeated attacks of colic, intermittent jaundice, the absence of enlargement of the gall-bladder, and the location of the tenderness to palpation, with the direction of the referred pain, will often indicate the diagnosis.

From carcinoma of the pancreas the diagnosis, as has been said, is difficult and seldom made. The more marked cachexia, the absence of pain or tenderness, enlargement of the gall-bladder, normal temperature, extreme jaundice, ascites, and the enlarged, smooth liver are the usual symptoms observed in malignant disease. When the liver is involved nodular masses may be palpated.

Chronic gastritis, especially when it is associated with catarrh of the duodenum or biliary passages, has been mistaken for chronic pancreatitis; but active medical treatment should soon relieve the symptoms which resemble those of the pancreatic lesion.

The treatment of chronic pancreatitis consists in the relief of tension by opening and draining the gall-bladder, with the formation of a biliary fistula. Cholecystostomy is the operation to be preferred to the former method of cholecystenterostomy.

The following cases of chronic pancreatitis occurred at the German Hospital recently.

E. O., aged forty-four years. Family history is negative. During early life he had measles, whooping-cough, scarlet fever, varicella, mumps, and diphtheria; but since twelve years of age has enjoyed almost perfect health until 1890, when he had an attack of diarrhœa lasting for nearly four years, more or less severe in character. Appetite is always good, and no dyspeptic symptoms have been experienced. He smokes five or six cigars daily, uses alcohol moderately, and is a man of very good habits.

In 1891 he had a sudden and severe attack of pain in the epigastrium, lasting two or three hours, then passing downward throughout the abdomen, and followed by diarrhœa; no vomiting. The pain was colicky in nature, and usually relieved by sinapisms. A number of attacks recurred at intervals of six months. In July, 1901, he had an attack similar to the preceding, but more severe in character; it lasted about two hours, and was relieved by the application of a strong red-pepper plaster; no vomiting. After this attack he enjoyed exceptionally good health until June, 1902. Owing to overwork, he became depressed and nervous. His physician found that his heart action was weak and irregular, and prescribed rest. Œdema of the feet was present, and a urine examination excluded nephritis. He then became progressively weaker, with anorexia, and again suffered from diarrhœa and pain in the region of the epigastrium, colicky in nature, but nearly constant. There was a sensation of bloating present. During the week previous to admission there was constant epigastric pain, with marked constipation and with rectal tenesmus and desire to have a bowel movement, without result. No nausea or vomiting; no urinary symptoms.

On admission the patient is flabby and rather stout, with a pale skin of a dull, ashen color. Scleræ are yellow, tongue is coated, and breath is foul. Pulse is rapid, and the patient is markedly nervous. Heart is weak, with a tendency to irregularity. The lungs are clear, and no apparent enlargement can be made of the liver, gall-bladder, or spleen. There is no albumin, sugar, or biliary coloring-matter in the urine. The epigastrium is tender and the abdomen distended. No palpable tumor could be detected over the pancreas, but chronic pancreatitis was diagnosed.

Operation under ether anæsthesia revealed a hardened and enlarged pancreas at its head, without any fat necrosis. The bowels were carefully gone over from the sigmoid to the pylorus, and no obstruction bands found, nor was there any peritonitis beyond the early stages of hyperæmia. The gall-bladder was distended and somewhat enlarged, while the liver was light in color and probably fatty.

A cholecystostomy was performed, with the difference that the gall-bladder was sutured to the peritoneum and aponeurosis without opening it, and gauze drains were introduced not only around the gall-bladder, but to the space below the liver.

The patient reacted very well from the operation, and two days later the gall-bladder was opened with the actual cautery, and rubber drainage instituted. Seven days after operation part of the drainage was removed, and thirteen days after operation the remaining gauze was taken out. The patient then became rapidly convalescent.

S. Z., aged fifty-five years. One brother died of tuberculous enteritis. Measles, whooping-cough, influenza, and malaria. Bowels are

irregular and appetite good. Moderate user of alcohol. The attack of malaria occurred twenty years ago, and was accompanied by jaundice, lasting for three or four weeks, and colicky pain in the epigastrium, followed by irregularity of bowels and dyspeptic symptoms for some years. Six weeks before admission he was seized with severe pain in the epigastrium, colicky in nature, and referred to the umbilicus; one week later became jaundiced, with intense itching. Urine was dark, and stools became lighter. No vomiting.

On admission patient was markedly jaundiced, with a slow pulse. He was a large man, with considerable adipose tissue. Examination of abdomen: The liver is enlarged, but not tender. The gall-bladder is large, palpable, and very tender, and an X-ray revealed a dense shadow in the epigastrium, to the right of the median line. The urine contained albumin, casts, and biliary coloring-matters, but no sugar. The blood showed a marked anæmia, 5000 leucocytes, and delayed coagulation. There were no gallstones in the stools.

Operation was performed, under ether anæsthesia, eight days after admission. The gall-bladder was much distended and fluctuating and non-adherent; it was aspirated of 350 c.c. of thick bile and the opening closed with a hæmostat. No gallstones were detected in the gall-bladder, cystic or common ducts. The pancreas was found to be enlarged, hard, and infiltrated. A cholecystoduodenostomy was performed, using a small Murphy button. The wound was closed with silk tier sutures, and except for a small stitch abscess the patient made an uninterrupted recovery, and was discharged twenty-eight days after operation. His jaundice had nearly faded, and the stools were of a natural color.

J. C. K., aged fifty-eight years; a shoemaker by occupation. Family and previous personal history was negative. Used alcohol moderately. His position while at work caused occasional pains in the epigastrium, but never vomiting. He had never, to his knowledge, passed blood or gallstones in the stools. Six months before admission he suffered from weakness, anorexia, and coldness of the extremities, and was placed on a milk diet, which caused marked constipation. Three weeks later he became jaundiced, which deepened, but without pain other than an occasional colicky attack to the right of the epigastrium. He lost weight—twenty-three pounds—during the six months.

On admission the heart and lungs were normal, the spleen not enlarged. Temperature and pulse normal. He was profoundly jaundiced and emaciated. The urine contained a trace of albumin; no casts or sugar; a normal amount of urea; absence of indican and presence of bile. A stomach analysis showed a trace of hydrochloric acid, the presence of lactic acid, and a total acidity of 12. Boas-Appler bacilli were absent. The stools were negative for free fat or gallstones. A number of blood examinations revealed an anæmia, no leucocytosis, and delayed coagulation. The latter was not benefited by the use of calcium chloride for the four days preceding operation. An examination of the abdomen found the recti muscles rigid, especially in their upper quadrants. To percussion an area of dulness could be detected over the region of the pancreas and extending above and to the right and merging with the liver dulness. The inguinal lymphatics were enlarged. A fluoroscopic examination revealed a diffuse shadow around the head of the pancreas.

Operation was performed four days after admission, under ether anæsthesia. The gall-bladder was found to be small and adherent to the liver, with a large stone in the cystic duct. A cholecystectomy was done and a peritoneal cuff sewed over the stump. Following the common duct with the finger in the foramen of Winslow a round, hard mass could be made out, presumably a stone in the common duct near the duodenum. The abdomen was deep and examination difficult, but the common duct was dilated to three times its normal size. The duodenum was opened opposite the ampulla, and the obstruction was found to be the head of the pancreas; the duodenum was therefore closed and opened behind, and a choledochoduodenostomy performed, with silk suture. An incision was then made in the right loin and gauze disposed about the anastomosis, leading across the stump of the gall-bladder and thence under the liver and out the loin. A rubber tube and two wicks of gauze were used to drain from the anastomosis through the abdominal wound. Abdomen partly closed. The patient left the table in fairly good condition, with pulse of 72. There was a continuous capillary oozing, however, and the patient grew weaker, the pulse feebler, and death took place twenty-four hours after operation.

A post-mortem revealed a chronic pancreatitis, mitral insufficiency, nutmeg liver, and chronic congestion of the spleen and kidneys. There was no fat necrosis.

Pancreatic lithiasis is a condition difficult to diagnose. Chronic interstitial pancreatitis is usually associated, and dilatation of the duct and cyst or abscess formation may result. The symptoms resemble those of biliary colic, with radiation of the pain to the left side; rarely jaundice. Glycosæmia may be present, and the calculi have been recovered from the stools. If the condition be diagnosed the stone might be removed by opening the duct through the duodenum in the same manner that a biliary calculus in the common duct close to the duodenum is extracted.

Cysts of the pancreas have been observed and operated upon a number of times by surgeons. In Körte's recent monograph 121 cases are collected, of which 60 were in males and 56 in females. According to the origin he divides them into:

1. Traumatic, following blows or continued pressure upon the abdomen.
2. Post-inflammatory.
3. Cysts without any apparent exciting cause. In this class of cases the cysts existed for a very long time and caused but few symptoms. A cyst of this character occurred at the German Hospital during the present year, and will be discussed shortly.

Anatomically, Robson gives this classification:

1. Retention cysts.
2. Proliferation cysts; cystic adenoma or epithelioma.
3. Hydatid cysts.
4. Congenital cystic disease.

5. Hemorrhagic cysts.
6. Pseudocysts.

Retention cysts are due, as a rule, to plugging of the main duct or of the smaller ducts, with consequent dilatation of them and of the alveoli. They have been recognized during the course of operation by several observers.

Proliferation cysts are usually true glandular cystomata.

Hydatid and congenital cysts are very rare conditions.

Of hemorrhagic cysts Mayo Robson writes that "it may be stated with emphasis that there is no valid or acceptable evidence in favor of the hemorrhagic origin of these cysts; the tendency to bleeding, in greater or less degree, is observed in all pancreatic cysts, and the presence, therefore, of blood in predominant quantity is not sufficient to establish a hemorrhagic onset."

Pseudocysts are usually traumatic in origin or follow inflammatory affections of the pancreas, and are really accumulations of fluid in the lesser peritoneal cavity. Jordan Lloyd concludes that "when the contents of such tumors are found to have the property of rapidly converting starch into sugar we may assume that the pancreas has been injured."

The situation of pancreatic cysts is variable. Any part of the gland may give rise to them, but the tail is the most frequent site. The direction of the growth is also variable; the greater number, developing in the lesser peritoneal sac, push the stomach upward and to the right, and emerge between the stomach and transverse colon. In some cases the tumor reaches the abdominal wall above both the stomach and colon, pushing them downward; in other instances the cyst is below the colon and at the lower portion of the lesser sac, between the two layers of the transverse mesocolon. Occasionally the cyst extends in the direction of the spleen or the kidney. As a rule, the cyst is adherent to the surrounding structures, especially to the stomach, colon, duodenum, omentum, and anterior abdominal wall. Some cases are free from adhesions, and excision is easy.

As to the contents, Robson, quoting from Körte, concludes that the characteristics of a pancreatic cyst are "a blood-stained, reddish-brown or dark fluid, slightly viscid, alkaline, rich in albumin, of a specific gravity of 1010 to 1020. Ferments are frequently present, and when in pronounced quantity establish the diagnosis; their absence allows no conclusions to be drawn against the pancreatic origin of the cyst." The writer has observed the contents to be oily, and again to appear like sebaceous material.

The symptoms of a pancreatic cyst depend upon the pressure exerted. In neither of the cases herein reported was pain a symptom of any moment. Both patients complained of epigastric discomfort at times,

but no distinct pain. Vomiting is usually present, is more marked after eating, and is in direct proportion to the amount of pain suffered. Our two cases were free from pain, and never complained of vomiting. Constipation is the rule, and jaundice may be present and is dependent upon the obstruction to the common bile-duct. Wasting frequently results, with advancing weakness. The presence of sugar in the urine, fat and undigested proteids in the stools, and decolorization of the stools has been observed, but is not constant.

The differential diagnosis must be made from renal tumors, such as hydronephrosis, enlarged spleen, ovarian cysts, hydatid cysts of the liver, mesenteric cysts, retroperitoneal sarcoma, and large abdominal aneurisms. The previous history and slow onset, with progressive weakness; the deep situation of the tumor and its immobility; the condition of the stools; and, further, the fact that the great majority of cystic tumors in the epigastrium are pancreatic, should aid in the diagnosis. The treatment of cysts of the pancreas consists in abdominal section and removal when possible; or in case of extensive adhesions, or their having a broad basal attachment, incision, and drainage.

The following cases occurred at the German Hospital during the past three years:

"Mrs. E. S., aged fifty-eight years. One brother died of tuberculosis. Previous history negative. Menopause at forty years of age. Her habits were good. Three years ago she had a "typhoid malarial" infection, as she termed it, which lasted for a number of months. The symptoms of this attack were but imperfectly described, but it evidently was a long and mild attack of enteric fever. A few years after the menopause she became stouter and corpulent, and has continued to slowly increase in the girth of the abdomen. Constipation was the rule, and occasionally she would have difficulty in micturition. She was sent to the hospital and the case diagnosed as ovarian cyst.

On admission the patient is a large and stout woman, with a circumference at the umbilicus of fifty-two inches. She suffers no pain. Examination of the abdomen revealed enlarged and tortuous superficial veins, general fluctuation, and deep-seated tympany in the right flank, and dulness, but not flatness, in the left flank. The anterior surface of the abdomen was flat to percussion, extending upward to the ensiform, and the area of dulness was not altered by any change in position. No outlines of a cyst or mass could be definitely made out, though there was a hard, cartilage-like body two inches below and two inches to the right of the ensiform, about 4 x 3 cm. in size and just beneath the abdominal wall. The lower border of liver dulness is displaced upward for two inches. The apex-beat is pushed slightly upward and to the left. Vaginal examination negative. The urine was free from albumin and sugar, and a blood count showed marked anæmia, with a normal leucocyte count.

Under ether an incision three inches in length was made in the median line above the pubis. On opening the peritoneum about

3000 c.c. of ascitic fluid were evacuated. It was then possible to determine that a large cyst was present in the upper abdomen, adherent to the anterior abdominal wall, colon, omentum, and other viscera, and by an adhesive band to the right broad ligament. The incision was continued upward to the ensiform, and the adhesions found so extensive that removal of the cyst was totally impossible. The lower three-fourths of the wound were sutured, leaving glass and gauze drainage in the pelvis. The cyst was aspirated of 500 c.c. of an oily, yellow fluid and its edges sutured to the aponeurosis and peritoneum, and the cavity of the cyst drained with gauze and a rubber tube.

The patient made an uninterrupted recovery, but the fistula from the cyst was not closed. An examination of the fluid aspirated found it to be oily, thick, and yellowish in appearance. On standing it separated into two layers—the upper yellow and curdy, the lower greenish-brown and thinner.

Microscopically, cholesterin crystals and a few epithelial and blood cells and an unrecognizable, colloid-like material. Specific gravity, 1023. Much albumin, but no sugar. Neutral or slightly acid in reaction. No methæmoglobin. Cultures on bouillon and agar showed negative results. Digests albumin without the presence of an acid.

Mrs. McC., aged fifty-eight years. Family and previous history negative. Has had nine children and five miscarriages. Menopause when fifty years of age. Thirty years ago, without any known cause or trauma, she noticed on awakening that she had a mass over the stomach and just below the left costal margin. This was not accompanied by pain or vomiting. It was about the size of a large orange. No jaundice at any time; no diarrhœa. The tumor has slowly increased in size, and is more apparent at present from loss of weight in the past two months. She has never had any discomfort from this tumor-mass, and suffers no dyspeptic symptoms.

On admission the patient is a stout woman, without any subjective symptoms. The lungs are clear and the spleen and liver dulness normal. Her abdomen is flaccid, and reveals the presence of a tumor extending from the umbilicus to the diaphragm, moving with respiration, slightly fluctuating, and can be slightly moved by the examining hand. It occupies the whole epigastric space, and is evidently a cyst in the lesser peritoneum (?). Urine is negative. Blood count shows absence of anæmia, but a marked eosinophilia of the leucocytes. Gastric analysis reveals a trace of lactic acid, a total acidity of 20 per cent., and the absence of free hydrochloric acid. Microscopically the Boas-Offler bacillus was present.

Operation was urgently advised, but was refused. She is still in good health at the present time, five months after discharge from the hospital.

Of the new-growths occurring in the pancreas, carcinoma is the most frequent. Sarcoma, adenoma, and lymphoma are rare, while in general miliary tuberculosis the pancreas is frequently involved. Syphilis, both congenital and acquired, interstitial and gummatous, has been seen, but it is rare.

The head of the organ is most commonly involved in carcinoma, and the disease may be primary, or, what is more frequent, secondary to

malignant disease of the surrounding structures, especially the stomach. Males are affected most frequently; from forty to sixty years is the usual age, and the most common variety is the scirrhous form.

The early symptoms are very vague and often lacking entirely. A gradual weakening of the muscles and a steady loss of weight, together with anorexia, a feeling of fulness after eating, and other symptoms of dyspepsia, will be noticed. This is succeeded very often by lancinating pains, becoming continuous, attacks of vomiting, and an ever-increasing jaundice, with enlargement of the gall-bladder. Glycosuria, fatty stools, or other evidence of retained pancreatic secretion may be present and aid in the diagnosis. Emaciation becomes extreme, and a tumor can be felt on palpation in the epigastrium, tender, hard, and scarcely movable. There is seldom any temperature, and ascites is frequently noticed. Death usually occurs within twelve months.

In instances where the common duct is not pressed upon, as in those cases where the malignant growth is confined to the body or tail, jaundice is absent and the symptoms atypical, and are like those of any other malignant growth.

Pressure on the portal vein and vena cava may cause thrombus and its usual sequelæ.

The differential diagnosis of this disease is exceedingly difficult in the early stages and rather easy in the late stages. The development of obstructive jaundice following dyspeptic attacks, with a distended gall-bladder and a rather increasing cachexia, are the most important signs, together with the effects upon the stools of the absence of the pancreatic secretion.

Two diseases—viz., common duct obstruction with a gallstone or chronic interstitial pancreatitis—must be diagnosed, because they are usually cured by a surgical operation, while malignant disease is nearly hopeless.

In the gallstone affection there is nearly always a history of previous colics, because the stone must have passed the cystic and traversed the common duct before impaction near the head of the pancreas. The gall-bladder is not distended, the rigidity of the right rectus is marked, the jaundice does not deepen until of a greenish hue, but alternately fades and disappears, often accompanied by intermittent pain, fever, and even rigors. There is less loss of weight, and the disease may drag on for years, though the longer the time that elapses between impaction of the stone and its removal the greater the risk of a carcinoma developing from the gallstone irritation.

In chronic pancreatitis the history of gallstone attacks and its association with dyspepsia must be elicited. The age of the simple affection is earlier, and there is more tenderness. The cachexia is very slight compared to that of carcinoma, and the jaundice is not so intense.

The treatment of malignant disease offers but little hope of cure. Robson records fourteen cases where the portion of the gland affected was removed, with ten deaths. The risk of injury to bloodvessels, together with shock, gangrene of the duodenum, and peritonitis, is great. The biliary stasis may be relieved by a cholecystostomy or a cholecystenterostomy.

The following case occurred last year at the German Hospital:

C. F. G., aged forty-three years. Family history negative. Has had dyspepsia and constipation for many years, and was in very poor health during early adult life. Six months before admission he suddenly became jaundiced, and without any pain. There was bile in the urine and clay-colored stools. Continued yellow, with a gradual loss of weight and strength, until three weeks ago, when he suffered from severe pain in the gall-bladder region and radiating to the right shoulder and back; had hæmaturia also. This pain has continued and increased in severity.

Examination on admission reveals marked jaundice, emaciation, and a mass between the umbilicus and the right costal arch. There is anæmia and 11,500 leucocytes. The patient insisting upon an exploratory operation, despite the diagnosis of malignancy, the abdomen was opened and a carcinoma at the head of the pancreas found. The gall-bladder, which was very much distended, was aspirated and closed with Lembert suture. The abdomen was closed with silk tier sutures.

The patient never stopped oozing after operation. Transfusion was performed, and the wound in the arm also continued to bleed. Death occurred in twenty-four hours. No autopsy was allowed.

The technique of operations upon the pancreas will vary with the needs of the individual case. The organ may be reached: (1) Through the gastrohepatic omentum, above the stomach; (2) through the gastrocolic omentum, below the stomach; (3) through the transverse mesocolon, back of the colon and stomach; (4) from the loin, behind the peritoneum.

Extensive lacerations or wounds of the pancreas should be treated as early as possible after the receipt of the injury, and the wound sought and closed with suture, avoiding puncture of the main duct. All hemorrhage, of course, is controlled; but in cases where the blood-supply is greatly destroyed necrosis is likely to result.

The pancreas is reached by widely opening the lesser peritoneum and turning the stomach up; the organ can then be seen and palpated, and, if necessary, the transverse mesocolon may also be incised to directly reach the gland. It is best to drain after operations upon the pancreas, and to favor the formation of a pancreatic fistula rather than allow the retention of the digesting secretion.

In acute pancreatitis surgical intervention had better be postponed until the primary acute symptoms, with the accompanying shock, have abated, or until the appearance of symptoms indicating suppuration.

The treatment has been outlined early in this paper. Should surgical intervention be demanded an incision may be made above the umbilicus and about four inches long. After opening the peritoneum the omentum may be examined for fat necrosis, and a vertical incision made in the gastrocolic omentum, opening the lesser sac. The pancreas can then be examined, and an incision in the transverse mesocolon will expose the gland and confirm the diagnosis. A second oblique incision is then made in the left loin at the costovertebral angle, and the lesser peritoneal sac cleansed of blood and packed with gauze. Partial suturing completes the operation. Prompt stimulation must be used to combat shock.

Chronic pancreatitis must be treated by abdominal section and cholecystostomy. The operation of cholecystenterostomy and choledochoduodenostomy are harder to perform and are not as effectual in securing free drainage.

Cholecystostomy. The gall-bladder is exposed by an incision through the right rectus muscle, and excepting in highly infectious cases is generally freed from adhesions, which when met with usually involve the abdominal wall, liver, omentum, duodenum, pylorus, and colon. The gall-bladder is isolated by gauze pads and aspirated of its contents. The puncture is then enlarged and the gall-bladder examined for stones; if present they may be removed with forceps or scoop. A small piece of iodoform gauze is introduced into the gall-bladder and the opening temporarily closed with hæmostatic forceps; the gall-bladder is then brought into the wound, if possible. A piece of gauze is passed around the gall-bladder in such a manner as to allow the lower end of the gauze to protrude from the lower end of the wound, and the gall-bladder is sutured to the aponeurotic layer of the abdominal wall. Before tying the gall-bladder sutures the gauze pads are removed, but not the gauze around the gall-bladder. The sutures are tied, the wound above and below the gall-bladder closed, the hæmostatic forceps removed, the piece of iodoform gauze taken out of the gall-bladder, and a solid rubber drainage-tube carried into the gall-bladder. This drains into a receptacle at the side of the patient.

The results of surgical treatment in this class of cases is very encouraging. Of twenty-four cases operated upon by Mayo Robson, in twenty-one a complete and perfect recovery ensued.

The operative procedure in pancreatic cysts will depend upon the degree of adhesion to surrounding structures; and as this almost invariably occurs, the extirpation of the cyst is difficult unless, as is the case in rare instances, the cyst is pedunculated. Aspiration of the cyst should only be performed when the patient is severely ill from diabetes or the effects of pressure. The cyst will always refill, and the danger of leakage into the peritoneum from the point of puncture is very great.

Whenever practicable the abdomen should be opened by a median incision above the umbilicus and by incising the gastrocolic omentum. This exposes the cyst. Its contents should be withdrawn by an aspirator, as the needle is removed closing the puncture with one or more hæmostats. The cyst wall is then drawn to the wound, and the subsequent procedures are exactly as in cholecystostomy, viz., suture of the cyst wall to the parietal peritoneum and draining the cyst. Where some of the contents of the cyst escape during aspiration it is safer to make a second incision in the loin and drain the lesser sac. Körte collected eighty-four cases operated upon by this method, with five deaths.

When the cyst is small, and from its position and relations cannot be brought to the abdominal wound, the rubber drainage-tube should be introduced into the cavity of the cyst, and by careful gauze packing so surrounded that leakage is prevented.

Malignant disease of the pancreas is better left alone, or a palliative measure performed, such as cholecystostomy or cholecystenterostomy.

X-ray Findings in Pathological Conditions of the Pancreas.

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It will generally be admitted that the X-rays may ultimately play a very important part as an aid in recognizing pathological conditions of the abdominal organs. Even at the present time much valuable collateral information may be obtained from this source, providing the picture as seen on the fluorescent screen or the photographic plate be properly interpreted.

While it is true that too much reliance should not be placed in the findings of the X-ray laboratory, especially in cases that involve the abdominal viscera, it is equally true that any possible errors are entirely due to the personal equation of the operator. It is probable, therefore, that as operators, with increased experience, improve their technique or have access to improved tubes and other pieces of apparatus, this source of error will be largely if not entirely eliminated.

The possible causes of errors of this kind become more evident when we remember that conditions of any kind manifest themselves, under the X-rays, as what are popularly termed shadows, and that these shadows, in turn, are caused by relatively dense masses of matter which intercept or absorb the rays of energy emanating from a vacuum tube. It will readily be appreciated, therefore, that in the abdominal cavity we may have causes for a variety of shadows of different densities, and that these shadows may or may not be due to pathological changes.

If we bear in mind, then, that X-ray findings, at the present time at least, can hardly be considered to furnish more than corroborative

evidence, we will not be likely to be carried way with the success or failure of a few isolated observations.

Among the organs in the abdomen the pancreas would appear to offer a most promising field for observation and study by means of the X-rays. Under supposedly normal conditions the head of the pancreas shows but a faint shadow on the photographic plate or the fluorescent screen; and while it is true that there are abnormal conditions, not necessarily pathological, that will increase this shadow to a considerable extent, these can, in many cases at least, be differentiated from the comparatively dense shadow that is always produced by an enlarged or hypertrophied pancreas.

With a view of soliciting comment or criticism, and also with a view of inducing others to follow or improve on our technique, it may be well to give an outline of our methods of procedure.

For the study of gross pathological conditions we have found the fluorescent screen to be more satisfactory than the photographic plate. It should, however, be understood that this applies solely to the gross examination and not to definite determinations of the presence or absence of any more minute details, such as a fracture of a rib or a renal or ureteral calculus.

The apparatus used for generating the X-rays is the ordinary type of induction coil, giving approximately a ten-inch spark. The tube that is usually preferred is one of the self-adjusting type, with extra heavy anodes, so as to take a considerable current without risk of destroying or puncturing the platinum plate. For examining patients we use a wooden table with heavy rollers and a comparatively thin wooden top. This table is so arranged that the vacuum tube may be placed under the patient and the latter moved at will to any position over the tube. In this way we are enabled to make a rapid and satisfactory survey of the different portions of the body without running any risk of either the patient or the operator coming in contact with the tube or the lead wires attached to it.

This method of examining has several advantages. In addition to the patient being perfectly safe from the electric current, he is comparatively comfortable, being perfectly at rest and always at the same relative distance from the anode of the tube. In addition to this, the light from the tube may be readily screened, so as not to interfere with or blur the image on the fluorescent screen.

The facility with which a complete survey of the whole body can be made is of importance in that it permits of a comparative study of the structure and muscular development of each individual. The uses of this will be recognized when we remember that each individual is a unit to himself as to structure or development, and that any undue muscular development may and often does cause shadows that may be misleading.

Having taken this preliminary survey, and satisfied ourselves of the absence of other possible pathological conditions, we will usually find, in cases of congested or hypertrophied pancreas, a distinct and comparatively dense shadow extending a little to the right of the median line and about midway between the lower end of the sternum and the umbilicus. In the majority of cases the shadow will be found to be rather longer than wide, and it seldom extends to the left of the shadow cast by the spinal column. One distinctive feature of the shadow cast by the pancreas is the fact that it is not readily movable with the motion of the diaphragm. By this simple characteristic we are usually able to differentiate between an enlarged or dense head of the pancreas and any pathological change involving the liver or stomach. Here, again, it must be borne in mind that we may have inflammatory conditions involving either of these organs that will produce adhesions, and these in turn will inhibit, or at least restrict, the natural range of motion. As a rule, however, such adhesions will also restrict, to a considerable extent at least, the normal range of motion of the diaphragm.

Another distinctive feature may be established by taking advantage of the fact that the pancreas is located near the posterior wall of the abdomen, and on this account the resulting shadow is readily displaced by changing the relative position of the body, tube, and fluorescent screen. For instance, if we move the cause of the shadow above the anode of the tube the shadow is thrown high up, but when moved in the opposite direction it appears to be comparatively lower down.

On a photographic plate the shadow is usually best shown from the posterior aspect. The plate should be placed against the back and extend from about the ninth dorsal to the fifth lumbar vertebra, with the anode of the tube about the median line and midway between the lower end of the sternum and the umbilicus.

Among other conditions that give abnormal shadows in this region we may have an undue overlapping of the kidney and the head of the pancreas, a floating right kidney, or even an enlarged or cystic kidney, though the latter may usually be recognized, being much larger and more sharply defined in outline.

A few of the objects that are particularly to be guarded against may be mentioned here. They are, among others, masses of food or even water in the gastro-intestinal tract; and for this reason it is preferable to make the examination, as nearly as we can, when the stomach and small intestines are comparatively empty.

Undue or uneven layers of clothing should be avoided. This is especially true of garments made from fabrics dyed black, as the latter are usually mordanted with either iron or chromium salts, and will usually give distinct and sometimes very dense shadows on the fluorescent screen or photographic plate.

Observing these few simple precautions, and always bearing in mind the possible differences in density of shadows due to the varying thickness or development of the several patients, we are not likely to go far astray in locating an abnormal or particularly dense shadow. The cause of the shadow must, of course, be more often determined from the clinical data than from the location or size of the shadow as determined by means of the X-rays.

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TROPICAL ABSCESS OF THE LIVER, WITH REPORT OF A CASE.

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THE patient, Max G., aged thirty years, a native of Russia, applied at Medical Clinic No. 1, of the Philadelphia Polyclinic, on September 2, 1901, and in Dr. Cohen's absence from the city was seen by Dr.

Truman Augé, chief of clinic, from whose excellent notes much of the history that follows is taken:

History. Three years ago, while in South Africa, being shut up in Kimberly, with insufficient food and bad water, the patient suffered an attack of illness characterized by looseness of the bowels, the stools occurring ten to fifteen times a day, being dark in color and streaked with blood or containing bright blood. The stools were not accompanied by pain. The patient's appetite remained good. The stools had not a particularly offensive odor. No record of fever could be obtained. His feet were swollen, and he lost flesh and strength. The intestinal discharges were at times apparently normal, but after a brief period would return to their former condition. Two months after the onset the illness was diagnosed dysentery by the physician then consulted; the patient suffered intermittently for about eighteen months, when he determined to leave South Africa. His condition improved as soon as he got on board ship. During the voyage he gained flesh and felt better, but did not gain in strength. The voyage lasted twenty-eight days. Improvement continued for about eight months after landing in this country. The swelling of the feet disappeared entirely two months after leaving the ship. About a year before his visit to the Polyclinic the bloody stools recurred, and had, according to the patient's statement, continued intermittently ever since. There had not been chill or fever. The patient attended the dispensary irregularly for about a month, during which time the condition of the bowels improved. Dr. Cohen saw him on October 7, 1901.

Physical Examination, October 7, 1901. The heart was displaced to the left and upward, the apex-beat being felt in the fourth interspace and nipple line, but otherwise normal. The sounds were weak; the pulse feeble but rhythmical, and not very rapid. The exact rate was not recorded. No pulmonary lesion was found. Both lungs were compressed, the right more so than the left. There was no effusion. On examination of the abdomen a mass was found occupying the right hypochondriac and umbilical regions. Its percussion-note was continuous with the normal liver dulness, which was also much enlarged upward, beginning in the fourth interspace at the right border of the sternum but in the mid-axillary line at the upper border of the fifth rib. The mass had a mean projection of one and one-half inches. It was tense, hard, and smooth; the lower edge was rounded and could be distinctly traced at a mean distance of about four finger-breadths below the ribs; the left border running from the apex of the heart to about one inch above the umbilicus, the margin then dropping to the umbilicus, and thence running to the right mid-axillary line at the same level on a curved line, with convexity outward. Posteriorly the dulness extended on the right of the spine from the ninth rib to below the costal border, reaching about three inches to the left side of the spine and tapering to a point. The splenic dulness began at the seventh rib in the paramammillary line, at the eighth rib in the posterior axillary line, and extended transversely from this point to the mid-scapular line, merging below with the dulness of the liver, these conditions probably indicating an enlargement as well as a displacement of the organ backward and upward. At the most prominent part of the mass, about an inch below the tip of the xiphoid cartilage, there was a circular area about as large as a silver dollar, having an elastic "cystic"

resistance. There was no pain or tenderness over the enlarged liver or over the abdomen and thorax at any point. Neither the thoracic nor the abdominal wall was reddened. There was no œdema. The abdomen outside of the dull area was tympanitic. No distinct hydatid tremor or fremitus could be found, but there was an indistinct and inconstant crepitus which could be heard over the tumor, and which it was thought might be due to daughter cysts rubbing against one another. The superficial veins of the abdomen were but slightly distended, and, except in the right groin, no lymphatic enlargements could be detected. A number of white scars were seen over the right hypochondrium and right chest, which the patient attributed to "winter pox" occurring in his childhood in Russia. The patient denied any venereal disease. The enlargement of the abdomen was first noticed aboard ship, shortly after leaving Africa, and it seemed to increase before an attack of dysentery and diminish afterward. It had given him no inconvenience, nor would he have thought it worth mentioning if examination had not been made. The patient was not jaundiced and not apparently anæmic. The tongue was but slightly coated. The blood, feces, and urine were examined by Dr. Coates, of the Polyclinic Laboratory, with the following findings:

Blood. Hæmoglobin, 80 per cent.; red blood cells, 4,570,000; leucocytes, 13,400—no abnormal bodies. Feces: bacilli coli communis; staphylococci; no amœbæ. Urine: amorphous urates; uric acid crystals; a few granular casts. Reaction strongly acid. No parasitic ova. No sugar; no albumin. Sulphates normal. Chlorides, 1 per cent. Urea, 3.2 per cent. Indican, small amount. No leucin or tyrosin; bile pigment and biliary acids absent.

Diagnosis apparently lay between abscess of the liver of amœbic origin and hydatid cyst. The long duration of the tumor, its enormous size, and the absence of the usual symptoms of abscess were strongly in favor of hydatid cyst; the history of the dysentery, however, which originated in South Africa, caused us to consider strongly the question of amœbic abscess. The patient had suffered no pain excepting recently, and that of only a transient kind. There was no tenderness and no history of previous tenderness. The elevation of the temperature was insignificant, and there was no history of marked fever or rigor at any time. The patient's general health was apparently good. The blood showed no marked leucocytosis. The amœbæ were not found after repeated examinations. There was no œdema over the liver, either in the thoracic or abdominal wall. The character of the enlargement, its smoothness, the absence of tenderness, and a sense of fluctuation at its most prominent part also tended to confirm the idea of hydatid disease. Strongly in favor of abscess was the fact that the patient reported that an exploring needle had been introduced into the swelling and that pus had been withdrawn; as this exploration had been made by a competent physician we were obliged to attach to it considerable importance. At the same time, however, it must be remembered that fluid similar to that described by the patient might have been obtained from a suppurating hydatid cyst.

The operation was performed on November 6, 1901. As the tumor involved the anterior portion of the liver more extensively than the posterior, it was determined to approach it through an incision just below the very much elevated costal border. A straight incision

three inches in length was made over the most prominent part of the tumor. The peritoneum was not adherent, and there was no fluid in the abdominal cavity. The liver appeared somewhat darker than normal, extended nearly down to the right iliac fossa, and on its upper surface, which was moderately adherent to the diaphragm, gave a sense of distinct fluctuation. An aspirating needle was introduced into the liver, and through it flowed a thick, brown pus. The general abdominal cavity was thoroughly walled off from the point of puncture by large gauze pads. After the withdrawal of the aspirating needle the abscess cavity was freely opened by means of the Paquelin cautery. An enormous quantity of pus of the character above mentioned escaped through a glass drainage-tube which was introduced, but, unfortunately, the exact amount could not be ascertained, because of the necessity of constant irrigation in order to prevent infection of the general peritoneal cavity and in order to thoroughly cleanse the abscess cavity; certainly, several quarts of pus were removed. When the abscess cavity had been emptied the liver had so contracted that the opening made by the cautery was no longer opposite the abdominal incision; therefore, a transverse incision was made along the costal border at right angles to the primary incision, a rubber drainage-tube and the packing being brought out of the lower end of this second incision. The patient reacted well from the operation.

There is very little to report in the subsequent clinical history of the case. The patient suffered from some cough for a few days after the operation, but otherwise made a very satisfactory recovery without complication. The drainage was at first profuse, but gradually diminished until about the middle of February, when it entirely ceased. Two points are worthy of note in the post-operative history: a very great increase in weight and a rapid contraction of the liver. An examination of the pus showed it to be sterile, and no amœbæ were found. Repeated examination of the pus and detritus failed to demonstrate the presence of amœbæ.

Pathology. The frequency of liver abscess among our soldiers in the Philippines and among the British in South Africa has brought this question into considerable prominence in English literature. Robinson[1] says that in 96 autopsies done on soldiers dying from dysentery in the Philippines liver abscess was found twelve times. Of course, pyæmia, traumatism, gallstones, and roundworms frequently produce abscess of the liver, but probably the most frequent cause of single abscess is some form of dysentery. And further, the amœbic type is that which most often produces the condition. The amœbæ can often be demonstrated in the scrapings from the abscess wall when not to be found in the pus itself. It is to be regretted that in this case the wall of the abscess was not scraped with this object in view. Although we look upon multiple abscess of the liver as usually of pyæmic origin, yet the fact that about one-half of the liver abscesses occurring in tropical countries are multiple would incline one to the view that

[1] Journal of the American Medical Association, May 12, 1900.

the amœba is more frequently than we suppose the cause of this variety. Giordano, of Venice, in discussing this question before the Intercolonial Congress of Medicine, 1900,[1] said that alcoholism was often a great predisposing cause of liver abscess, and in this view Adami agreed, though he asserted that the determining cause was an ascending angiocholitis of intestinal origin. These statements regarding the predisposing tendency of alcohol may explain, to some extent at least, the greater frequency of liver abscess among American soldiers in the tropics than among the more temperate natives. The abscess may be found at any point in the liver, but is most frequently situated in the right lobe either near the anterior or posterior border. If left to itself the abscess will, in most instances, rupture into the pleura or lung, although rupture into the peritoneum or on the surface is not rare. Spontaneous cure often results from rupture into the lung, as in the case recently reported before the County Medical Society by Dr. Boston, but, of course, to wait for such an occurrence would be extremely unwise and comparable to the fallacy of waiting for adhesions to form after making a diagnosis of appendicitis. It is needless to say that unless immediate operation is done intraperitoneal rupture is invariably fatal. The mortality of liver abscess without operation is between 90 per cent. and 95 per cent., those cases recovering usually doing so after rupture into the lung.

Treatment. The treatment, when once a diagnosis is made, is entirely surgical, and consists in thorough opening and thorough drainage. The aspirating needle may be looked upon in some instances as a safe diagnostic means when proper aseptic precautions are taken, but it is by no means a sure measure, and should only be employed when the surgeon is prepared to proceed at once to operate in case pus is found. This is particularly true when the abscess is situated anteriorly, for here the infected needle must traverse the peritoneal cavity, which is in most instances not shut off by adhesions. It is quite true that in many cases the needle is used, pus is found, immediate operation is not done, and the peritoneum is not infected; in fact, it was true in the case here reported; but the practice is a bad one, exposing the patient to considerable unnecessary risk. Anyone having experience with the exploring needle needs not to be told of its inaccuracies or how very misleading its evidence oftentimes is. The proper time for the employment of this instrument arrives when the liver has been exposed by a free incision and the surrounding cavity, pleural or peritoneal, properly protected with gauze. At this stage the needle not only locates the abscess but indicates to the operator the best point at which to drain. There are two recognized methods of operating in

[1] British Medical Journal, October 13, 1900.

this condition, and between them, foreign surgeons particularly, are much divided. The first operation is that of immediate drainage, while the second consists in exposing the liver, allowing it to become adherent to the abdominal wall, and then opening it twenty-four or forty-eight hours later. In the hands of an experienced surgeon the former operation would certainly seem to be the most satisfactory procedure. Under doubtful aseptic circumstances an inexperienced operator would probably be wise to follow the second method. Smits[1] reports, from the island of Batavia, the most gratifying results from the employment of the two-stage operation, 16 recoveries out of 19 operations. It is doubted, however, that these good results were altogether due to the two-stage operation. After the location of the pus by the needle we believe that there is no better instrument for incising the liver tissue over the abscess than the Paquelin cautery. Curettement of the abscess wall is a measure strongly advocated by Fontan, but its employment in abscesses of short duration would seem questionable and, in fact, the present case would tend to show that it is not an essential part of the treatment even in abscesses of long duration. In the introduction of the drainage-tube care must be taken that the end of the tube does not rest on the abscess wall, else such pressure might produce necrosis and perforation at this point. One point in the technique of this operation which is frequently dwelt upon is the stitching of the liver to the abdominal wall. This procedure does not seem necessary if the precaution is taken to carefully surround the tube with gauze, and might possibly interfere with the subsequent contraction of the abscess cavity. It was not done in the present case nor in another recently seen in which an equally good result was obtained.

A STUDY OF SOME CIRRHOSES OF THE LIVER.

By Beverley Robinson, M.D.,
of New York.

No doubt the majority of practitioners believe they know pretty well about cirrhosis of the liver. It is a common affection, particularly in hospitals and dispensaries. In its advanced stages it is readily diagnosed, as a rule.

In regard to its prognosis and treatment: These appear relatively simple in that formerly at least it was assumed by very many that we had to do with a fatal complaint; and as for remedial measures, they resolved themselves into few, among which paracentesis at the last

[1] New York Medical Journal, February 9, 1901.

stage only was imperative, mainly to relieve distress. How far such notions to-day are removed from truth I shall endeavor to show later.

That the liver is a difficult organ to study and know accurately few will deny whose opportunities and mental make-up prove them competent observers. As compared with other abdominal or thoracic organs, where does it stand? The lungs can be inspected, palpated, percussed, auscultated, and in a way measured. So, perhaps, can the liver; but in the former case we seem to be in more accurate touch latterly by reason of sputa examinations under the microscope and inoculation experiments. The heart and its disorders have been the source of so many investigations in the physiological laboratory, so many accurate clinical observations in the office and the class room, hospitals, and dispensaries—everywhere and at all times—that little new may be added. With the advent of physiological chemistry, the use of the microscope, and the opportunity, daily or hourly almost, of knowing precisely what the urine shows, the kidneys as organs are very clear to us. With the liver, on the contrary, much seems still conjecture and hypothesis. We speak of its torpidity, engorgement, anæmia, its functional derangements, its organic lesions, with glibness at times; and yet there is much that is obscure about its functions, healthy and morbid, that is by no means evident, and about which there are very honest and almost irreconcilable differences.

In this connection, only very lately, Dr. Goodhart writes: "The largest organ of the body, its imports and exports must be enormous, and from the familiar way in which it is spoken of there cannot be a man in the whole world who does not think he knows all about it. But what are the facts? We know something about the physiology of the liver; but this knowledge has been mostly obtained by experimentation on the lower animals, by observations that occasional cases of disease afford us, and by certain inferences that we draw—very much at second hand—from the changes produced by disease in the organ. But all these things—valuable as they are, and without which where we should be I do not know—yet are very far from giving us that real and intimate knowledge of the living organ that we require to enable us to treat its diseases."[1]

Should this not be adequate reason why we approach the study of the cirrhoses with much diffidence and full recognition of our deficiencies, even in the rôle of an upright reporter? "Good men and true" have essayed this work faithfully in the past, and told us many things we should know. A great deal more is required, much research remains to be done, and only by degrees may we legitimately hope to secure truth—entire and with full details.

[1] British Medical Journal, August 3, 1901, p. 251.

In what relates to the cirrhoses there are many undetermined questions. The views ordinarily held are not entirely correct. In the first place, the clinical facts, the more we become conversant with them, do not justify invariably the gloomy prognosis of these affections which has been entertained. Instead of separating with discrimination, there has been confusion, because all forms of the disease have been thrown together and included as one. In fact, here as elsewhere, the work of the dead-house has reigned supreme for a time, and the close watching of patients during life has been deemed of lesser value, when it should always, as I believe, be the first thought of every good physician. How, indeed, can we treat a patient properly unless we know just what symptoms he presents during life and in what manner and to what degree function was disturbed? Everyone who has grown gray in harness and whose experience has widened and deepened knows that the morgue and the laboratory by themselves ignore too much and too often the intricate and obscure of our economy in a dynamic sense, and hence must be always controlled, as it were, from the horse-sense point of view of even the humbler humdrum daily worker at the bedside.[1]

There are different forms and degrees of cirrhosis. Not all at once and every time does the final atrophic stage, with its irremediable anatomical conditions and its absolutely gloomy horoscope, show itself. This form is slow and insidious of development. At first it is not recognized; there are few or no symptoms we can attach to it. At best we can only be suspicious.[2] If we have to do with a chronically hard drinker of beer or spirits, of course, we think of the liver and fibroid changes; and then if there be palpitations of the heart, evidences of dyspepsia, vascular stigmata on the face, corpulency, and a somewhat enlarged liver we cry a halt to bad habits, and the outlook may be sombre. On the same lines, if we find loss of strength, inappetence, and a failure of nutrition, as shown by loss of weight, even though the liver be of normal size apparently, we cannot avoid somewhat gloomy forebodings unless we are able soon to control habits and regimen. But are we sure—may we be reasonably certain—with such vague characters that we shall even later be able to fix an absolute and correct diagnosis? The answer—the only one—must be negative. The sooner the better for every medical student to know that disease does not run closely at any time along so-called prescribed lines. It varies, it differs; one day we see certain forms of disease, another day it is just the contrary. All cases are in a certain sense individual,

[1] Vide Andrew Clark, British Medical Journal, February 3, 1883, p. 191: "Address on Clinical Investigation before the Clinical Society of London."

[2] In writing of early stages of hepatic cirrhosis, Billings claims there is a relatively large number of patients whose symptoms are those of neurasthenia, myalgia, mononeuritis, or gastro-intestinal disturbance.—Medical News, July 26, 1902, p. 167.

personal. There is nothing wholly general and all-absorbing about any one instance. Take, for example, the abdominal effusion in cirrhosis—the ascites which in the later stages is so striking, so characteristic, so grave of import in the eyes of many that it seems like to a funeral knell in its fatality. Is it so? May it not appear soon, and in its earlier stages may it not be treated wisely and advantageously? And may not a patient do well for a long while, thus treated? And why is this? May not very many of the liver cells still be functionally healthy, quite capable of carrying on good nutrition? Is not fibrous growth in the liver usually slow? Does it not leave many lobules untouched for many a day by its contracting power, and otherwise in what degree is it really pernicious? These and other queries immediately arise to one's mind. It is, moreover, a fact of daily experience almost to have patients come to our office or to out-door clinics in whom ascites is undetermined. We are unable to affirm positively that it exists. And this is true not for one examination only, but for many. Days, months, and even years elapse with some patients before we can say convincedly this *is* or this is *not* a case of hepatic cirrhosis.

The three principal forms of cirrhosis which are recognized by writers are (1) atrophic, (2) hypertrophic, (3) syphilitic. Besides these there are so-called minor, even undetermined, forms. Usually the latter are due to passive congestion, brought on by pressure from neighboring tumors or indicative of some chronic disturbance of heart power, structure, or action. In these instances, especially where the heart is the primary cause, the abdominal ascites is merely a symptom which is part of a general anasarca. It may be, however, that the ascites has something special in it; it may stand by itself, as it were, so far as effusion is concerned in the serous cavities. Then we have to do with an expression of cardiac inefficiency accompanied by one of the known effects of portal obstruction due to fibrosis around the vessels of the liver. In these cases we should look rather for hypertrophy than atrophy. The liver is enlarged and engorged. It is filled with blood from overcongestion. There may or may not be already marked fatty change, and thus, instead of the dense, hard, tough liver with sharp lower margin, which is said to characterize the cirrhotic liver, we may have a greasy, rather soft structure, which leaves the impress of the finger upon its surface when we press with even very moderate force. While, then, it may be admitted, and is certainly true with limitations, that all three forms of cirrhosis of the liver are characterized by increase of fibrous tissue, which penetrates its structure and distributes in somewhat different ways along the branches of the interstitial tree, it is also true that these forms are all different in many particulars.

Their pathology, to begin with, is not the same. In one form—the hypertrophic—the fibrous tissue is finer, less formed, accompanied by

a cellular growth, and runs along the smaller branches interstitially. In the atrophic form this fibrous tissue is coarser, better formed, shows greater tendency to contract upon and disorganize liver cells, extends along larger branches of the interstitial tree, and is not accompanied by cellular growth to the same degree at all.

In connection with the increase of connective tissue it has been proven experimentally that the action of alcohol on the liver of animals is also to cause granular and fatty degeneration of the liver cells. According to Vaughan, the increase of the connective tissue is small in amount, and only reported by some observers. Vaughan concludes that "the connective tissue changes are subsequent to and dependent upon alteration in the hepatic cells."[1] Later on he writes that with the clinical and experimental evidence hitherto obtained we are justified in believing "that in alcoholic cirrhosis the pathological changes begin in the hepatic cells."

From what has been said concerning the pathology and etiology of atrophic and hypertrophic cirrhosis it has been shown that the two forms may exist as types. They may also be present combined, as it were, in the same individual and exist as one disease. The atrophic form is clearly due, as a rule, to alcohol; the hypertrophic to infection (Vaughan); but the infection may precede or follow the toxic poisoning, and the result is a mixed form of cirrhosis. These forms, both clinically and at the autopsy, are very difficult of precise diagnosis, so intimately and curiously combined are their symptoms or lesions.[2]

In the syphilitic cirrhosis we have those broad bands of fibrous tissue which penetrate between the lobules and draw the liver down near the surface in such manner as to leave the puckered, scarred appearance, with bossy, prominent, irregular masses between which are so characteristic.

As to the course and clinical symptoms: These, we shall see, differ widely and obviously in many ways. In atrophic cirrhosis, for example, the main distinguishing clinical feature, as we could almost premise from its pathology, is the evidence of marked portal obstruction—at least this is true almost as soon as the disease is clearly determined. Hence arises the abdominal effusion, and with this most significant and almost portentous sign we have hemorrhages from the stomach and bowels. Sometimes these are small and infrequent, and give no great and immediate alarm if their quantity alone is consid-

[1] Journal of American Medical Association, October 5, 1901, pp. 878, 879.

[2] In a patient I saw last summer, who subsequently died, the liver was stated during life to be *much enlarged* by several very competent observers—both surgeons and physicians. I was able to satisfy myself after death, by intra-abdominal digital exploration, that the liver was *not notably* enlarged. I was also convinced that an intra-abdominal mass, in close juxtaposition with the lower margin of the liver, gave rise to an error of diagnosis in this regard, although the case was proven not to be one of cirrhosis of the liver.

ered; but considered from the point of view of their evident causation, great apprehension is invariably excited, and justly so. Shortly we may have, and do often, those abundant and depressing blood losses so difficult to arrest, and which point to the urgent necessity, and none too soon, of employing all rationally known measures to ease up an obviously crippled organ and to restore falling strength. How unfortunate it is in such cases if the somewhat too enthusiastic surgeon finds indications for abdominal exploration or an operation for internal hemorrhoids! Jaundice is a rare sign in these cases[1]—at least real jaundice, with urine loaded with bile pigment and acholic stools. Of course, the dull, earthy hue of the skin and the subicteric tint of the sclerotics are frequent phenomena which serve in a measure to fix our diagnosis. Sometimes "adhesive pyelophlebitis closely resembles the atrophic form of interstitial hepatitis. The rapidity with which the peritoneal effusion reforms after tapping is an important diagnostic sign."[2]

These cases of atrophic cirrhosis in reality are long as to duration. They appear short merely because they are unrecognized prior to the advent of the ascites, and then the inevitably fatal termination seems to stand out imminently, since a few months or a briefer period may bring about a fatal ending of the case.

The first and imperative thing to do with these patients is to lay down the law which forbids alcoholic stimulation in any form, because, as we know, in the chronic irritation thus produced we find the immediate and efficient cause of the majority of such cases. Of course, there are degrees of injurious action. The man who has drunk heavy beers for a long while and in large quantities, combined, it may be at times, with daily potations of spirits undiluted and containing fusel oil, is the worst type with which we have to do. Such an one is the longshoreman, hodcarrier, and other laboring man, or the chronic loafer who comes to our out-door clinics or to our hospital ward, when, on investigation, we find the contracted, small hobnailed liver, which shows the condition of multilobular cirrhosis and also many accompanying pathological changes. The spleen and pancreas are often hard and functionally decrepit, the kidneys show marked interstitial changes, the stomach is thickened, atrophied, and congested; but, above all, the heart is weak, flabby, degenerated. Fibrous myocarditis is sometimes made out at the autopsy; more frequently we have more or less fatty change, apparent to the eye and corroborated with the microscope. The general vascular system does not escape, and capillary

[1] Where fatty degeneration and cirrhosis coexist profound, persistent jaundice is less infrequent. A patient thus affected, as shown by the autopsy, died in one of my wards at St. Luke's Hospital May 8, 1902.

[2] James H. Wilson, Medical Record, December 7, 1901, p. 909.

arteriofibrosis has run its course, so that there is scarcely a sound arterial coat to be found, no matter what organ we turn to. This is, indeed, a gloomy and, alas! too true a picture. Alongside, fortunately, we have another far more hopeful. The man-about-town, the broker, the business man—even the lawyer and the not too wise physician—whose drinking consists in two or three or more "Manhattan" or "Martigny" cocktails every day, taken upon an empty stomach and as "a pick-me-up," as the saying goes; the genial, pleasant fellow who gives himself a rest of an evening, and who frequents the club and the billiard-room, and who before the evening is gone has consumed several drinks of "rye" or "Scotch" or "unsweetened," is also an apt candidate for admission among the cirrhoses of the atrophic order. Fortunately, such an one drinks good spirits, as a rule, in the sense that it is relatively pure and unadulterated. Moreover, his food is well cooked and assimilable. He bathes, and is therefore cleanly and has an active skin; and with a healthier body, perhaps, to start with he does not suffer so soon or so hopelessly as the poor chap I have previously considered. Moreover, when the first premonitory signs of disease occur, if he be even moderately wise, he consults his family physician, when I would fain believe he secures a mental and moral shaking up, with which a little useful medicine added thereto allows him to guard more carefully his still useful liver cells, and gives declared fibrosis an opportunity to cease development and extension for a time.

Without going further in this description I trust I have been able to show and bring home to my readers what they all know, what they all feel and see around them every day. Turn, now, to our hypertrophic form of cirrhosis, and what may we note? Here, instead of atrophy and contracture and loss of size, we have enlargement and increase of weight. In addition, there is to be found a singular development of new biliary canaliculi on the periphery of the lobules, which is so distinctly shown in sections for microscopic insight. This latter division is the one so ably described by Hanot, Charcot, and other French writers, and about which there is such wide divergence of opinion elsewhere. Suffice it to add that in typical forms these must be very rare, infrequent cases. For my own part, I do not recall to have seen and observed a typical one—at all events, not one where the post-mortem researches justified altogether a previous clinical diagnosis. In the hypertrophic cirrhosis of the sort we do see from time to time the fibrosis as it extends into the liver seems to mark for its own a few cells here and there throughout the structure, or certain individual lobules. In this hypertrophic form ascites does not often occur, nor should we expect it if we pay due regard to the special characters of the fibrosis formation. Jaundice, on the contrary, is a marked and almost omnipresent symptom; and it is the real jaundice—not the

aborted state, so to speak—to which I have referred in the atrophic form of cirrhosis, *i. e.*, icteroid hue.

Like to atrophic cirrhosis, hæmatemesis is not infrequent, and, when it occurs, abundant and very threatening. Many of these hemorrhages in cirrhosis originate at the lower end of the œsophagus. They are often confounded with hemorrhages which come from ulcer of the stomach.[1] In either case, but especially the former, we should be very chary about the introduction of a stomach-tube, as a dangerous or even fatal loss of blood might take place immediately. With the hemorrhage from the œsophagus or stomach we see developed many acute symptoms. There is fever, and often the temperature ranges high. There is delirium of an active kind, pointing to a toxæmia and blood infection. "Chills and sweating are not common" in the hypertrophic form of interstitial hepatitis, "thus serving to differentiate it from impacted gallstones." (Wilson.)

Later the patient may relapse into coma from which there is no awakening. Before these symptoms of delirium and coma become manifest we usually have several repeated intermittent attacks of pain, with fever. The pain is localized over the hypochondrium, and the liver is tender.

In these particulars we have an approach to the syphilitic form, and except for the history, the different physical signs, and other symptoms, we might have a difficult diagnosis; but this is not true for the careful diagnostician, who also considers the ordinarily chronic course of the disease.

As to causation, it is obscure. Frequently the spleen also being enlarged a malarial origin is suspected. There are too few observations accurately made in which the plasmodium has been discovered to altogether justify this opinion. I rather believe that alcohol is here again a more probable and efficient factor in bringing on this change in liver structure. One statement would seem to be borne out by facts that we do know, and it is that the obstruction of the bile ducts by fibrous tissue seems to account for the genesis of the acute symptoms which mark the course of the disease and point to inflammatory conditions, more or less lasting. According to some authors, such inflammatory conditions are wholly ignored, and they affirm that an infective process is the sole, undeniable cause of hypertrophic cir-

[1] According to Knapp (Medical Record, March 1, 1902, p. 334) these hemorrhages are sometimes erroneously "diagnosed as pulmonary tuberculosis," when they should be considered "cases of ulcer of the œsophagus."

According to Bouchard (Revue de Médecine, October, 1902) hemorrhages in cirrhosis, which occur outside the territory of the portal vein, are in relation with pre-existing arterial lesions, affecting various organs, and do not depend upon abdominal plethora. The arterial lesions are chronic degenerative changes probably due to arterio-sclerosis.—Boston Medical and Surgical Journal, September 11, 1902.

rhosis. In this conection Vaughan[1] writes: "With our present knowledge it must be attributed in all cases to infection." If this be admitted, pathologically, it may be stated that "the epithelium of the gall ducts is the site of the primary involvement." (Vaughan.)

In the syphilitic liver we find marked induration, at times fairly recognizable by our tactile sensations. The liver itself is, as a rule, larger than normal. This is not an invariable rule, and just the contrary may be found, no doubt, in those instances where the fibrous contracting bands are broad and numerous. The gummata on the surface of the liver when they exist are often easily recognizable. Of course, we may confound them with malignant nodules on the one hand or perhaps the hobnailed condition of atrophic cirrhosis on the other; but the bossy, lobular forms of the tumors, together with the previous history and other signs of syphilis, or, in the absence of both, the notable cachexia of cancer, if present, enable us to be pretty confident as to our differential diagnosis. In reasonable doubt an accurate blood count with differentiation of white cells will help us much. A decided and relative increase of lymphocytes and of eosinophile cells, according to Neusser or Cabot, would make this point very valuable. Of course, "a disappearance of the tumor after a tentative antisyphilitic treatment argues most positively in favor of gumma."[2]

So far as clinical symptoms go, syphilitic cirrhosis resembles one of the other forms. There may be jaundice and no ascites; there may be both ascites and jaundice.[3] On the other hand, there are instances in which neither sign is present. At an advanced stage, however, ascites can usually be determined; and what is of particular value is the localized pain in the right hypochondrium which is usually present. These pains are not constant, as a rule, but come on intermittently, or at all events are greatly intensified if previously they have been present in a mild, dull form. The pains during the exacerbations may become so intense as almost to resemble those of gallstones. If the disease has existed for a long while there is decided loss of weight, but scarcely ever to the degree which characterizes malignant disease. Constipation and various functional disturbances of the stomach and intestines are frequently present.

The congenital form of syphilis of the liver I do not remember to have met with; if I have my memory is too uncertain to be a faithful reporter.[4] By those who have seen or described it it is said to be a diffuse fibrosis, where the abnormal tissue formation penetrates into the

[1] Ibid. cit.

[2] Einhorn, Medical Record, August 17, 1901.

[3] Stockton states when jaundice occurs, even with apparent alcoholic cirrhosis, especially if accompanied by cachexia, it is well to suspect syphilis.—Medical News, June 28, 1902, p. 1244.

[4] According to Osler it "is rare and nearly always overlooked."

lobules or between the cells. The fibrous tissue is an immature development. The liver itself is large and it is accompanied by jaundice, ascites, and emaciation.[1] While as regards the pure pathology of cirrhosis, as Cheadle says, there is more or less unanimity among writers, this is not true of the causation of symptoms as connected with morbid anatomy, nor of the course and clinical manifestations of the disease in its various forms. One of the questions for settlement is to know whether the atrophic form is anything more than a later stage of the hypertrophic. Further, more definite judgment as to Hanot's biliary cirrhosis is desired, and as to whether hypertrophic cirrhosis is a real entity. These and many others are of singular interest. It is ordinarily accepted that atrophic cirrhosis is mainly caused by alcohol; indeed, that it is the essential cause in the vast number of cases. Still, malaria has seemed to be a sinning factor at times. Unfortunately, a typical case of malarial origin is rarely found, at least with us in New York. This may be accounted for, and doubtless is, by the relatively mild form of malaria from which we suffer. The æstivo-autumnal sort, with the characteristic crescents in the blood, does not occur often. They are relatively exceptional. Now, it is in just these cases or those of long-continued malarial cachexia, where we find great enlargement with fibroid induration of the spleen and also of other abdominal organs, notably the kidneys. Why, then, should we anticipate finding well-marked morbid effects of this sort in the liver if, as I do believe, the liver as an organ is not nearly so apt to be much affected by malarial poison as is the spleen? Also, I would state that it is most unusual for us to discover cases of profound malarial poisoning where we could absolutely eliminate the disastrous influence of alcohol from the equation; and yet it is stated, even by those who claim never to have seen a case of malarial cirrhosis, that there is nothing absolutely improbable in the assumption, inasmuch as malarial indurated spleen is fully determined. To my mind, this reasoning by analogy is very lame and inapplicable to the liver, in view of the fact of its very different structure and functions. When we consider how prone the liver is to become engorged and somewhat cirrhotic in all cardiac affections as well as in all obstructive lung diseases, it would seemingly be doubly reasonable to eliminate the malarial factor in causation, unless pretty

[1] Vide Cheadle. Lumleian Lectures for 1900. It affords me great pleasure in this connection to speak with admiration of these lectures, and to state that I have freely used them in writing this paper. Indeed, I have followed his outlines (Cheadle's) because I could find none better.

Since the above was written, Dr. George G. Sears and Dr. F. T. Lord have published in the Boston Medical and Surgical Journal of September 11, 1902, a very important paper on cirrhosis of the liver, based on all the fatal cases in the Boston City Hospital and the Massachusetts Hospital since 1896 in which the diagnosis was proved by histological examination. Many of their conclusions, according to the London Lancet of October 15, 1902, are only confirmatory of those published in England by Dr. Cheadle and by Dr. Hale White.

clearly evident. I direct particular attention to this statement, because I know that in most text-books malaria is insisted upon as a cause of atrophic cirrhosis of the liver. Osler,[1] in this connection, writes: "In our large experience with malaria during the past nine years not a single case of advanced cirrhosis due to this cause has been seen in the wards or autopsy-room of the Johns Hopkins Hospital." Now, it is well known that the malarial manifestations found in the city of Baltimore—a few indigenous, many coming from regions farther South—are more virulent than those we meet with in New York or other cities of the North in the United States.

Osler also writes,[2] in speaking of the liver: "Only those cases in which the history of chronic malaria is definite, and in which the melanosis of both liver and spleen coexist, should be regarded as of paludal origin."

There seems to be little doubt, also, that hypertrophic and atrophic *alcoholic cirrhosis* are distinct forms of disease and not different stages of the same form. This affirmation seems reasonable when we consider the very marked difference in the distribution of the fibrosis as well as of its nature in the two cases. In the one the affection is markedly multilobular; in the other it is monolobular in quite as pronounced degree. According to Cheadle, the error in confounding the two diseases arose originally from the hypothesis that Hanot's so-called biliary cirrhosis was simply the hypertrophic form. In many instances of cirrhosis of the latter form there is unquestionably a period when the liver is simply congested and enlarged, and yet no formation of abnormal fibrous tissue is yet begun, not to speak of any degree of contracture which later on may prevail. In these cases the liver is said to be much softer than it is where hypertrophic cirrhosis has become developed. This statement is no doubt true, and can be shown obviously in the autopsy-room on rare occasions. When it comes to actual clinical work and interpretation I am obliged to confess that this stated hardness as compared with softness, where the large liver is merely congested, is very difficult to differentiate. I have seen many cases of enlarged, smooth liver where there were few or no symptoms of ill health, unless, perhaps, slight evidences of dyspepsia should pass for such. In these cases the tactile sensations, so far as relative hardness is concerned, revealed little or nothing from this standpoint. This judgment is specially correct, I am confident, where the patient is corpulent, with thick abdominal walls, due to the deposit of adipose tissue. In spare, meagre individuals, with lack of muscular tone and relaxed abdominal walls, the problem to be settled is much easier, and we may indeed say, truthfully, "Liver is hard or liver is soft." Of course, we should never

[1] Practice, fourth edition, p. 570.

[2] Ibid. cit., p. 209.

expect to find in hypertrophic cirrhosis the extreme *hardness* to tactile sensations which is characteristic of the atrophic form; nor is it rational to expect it when we consider the very great difference which exists in the variety of the fibrosis—fine in one case, coarse in the other. The same cause—alcohol—which produces fibrosis of the liver also effects interstitial changes in other abdominal organs, and particularly the kidneys, which are thus affected in a large proportion of cases.

Despite the fact that it is affirmed that jaundice does not occur in atrophic cirrhosis, this statement cannot on inquiry and research be confirmed. On the contrary, it would seem as though we may and do have jaundice in all forms of cirrhosis. What is true is that jaundice occurs earlier in the hypertrophic form than it does in the atrophic, and hence, of course, when it does show itself in the latter form it is a sign of very bad augury. Many of the particular symptoms given by Hanot to designate specially his form of biliary cirrhosis are to be met with in the ordinary hypertrophic form, many of which are doubtless alcoholic; but when we come to consider the whole description of this writer we fail to find him in accord with other observers—mainly outside of France. Even the hyperplasia of bile ducts which Hanot considers so characteristic may be found in other forms. The jaundice does not always occur in the usual hypertrophic form, nor, again, is ascites always absent, and the spleen may not be visibly enlarged. Pain and pyrexia simply show advent of perihepatitis, and, although frequent in the hypertrophic form, it may also occur in other forms. Nervous phenomena and the typhoid state are more frequent in this form, but they are not absolutely distinctive. Chronicity is not constant, and, as we see, already, cases do not conform in all respects to a purely classical type. Where alcohol is a prominent factor in causation the symptoms approximate those of the atrophic form. No doubt in just such instances the hypertrophic liver is specially hard. The syphilitic liver, like the hypertrophic form, is often enlarged, extending in the right mammary line far beyond the right free margin of the ribs. If gummata are present they may be recognized, as already stated, by the distinct irregularities or bossing of the surface. If instead of gummata there is a cirrhotic process due to syphilis, the liver may also present a swollen appearance, and this is also true if amyloid degeneration has become manifest, which may be shown in advanced syphilitic conditions of the liver. In both syphilitic cirrhosis and amyloid liver the organ is hard and relatively smooth (Einhorn), and in the former case the fibrosis is said to be diffuse and monolobular. (Cheadle.) Not always is the syphilitic liver large; it may be small, and is thus often confounded with the alcoholic liver. This is especially to be regretted from a therapeutic standpoint, knowing as we do how invaluable antisyphilitic treatment is in these cases. Perihepatitis, while

not pathognomonic of syphilitic liver, occurs very frequently in connection with it. Moreover, in this form a similar condition is more apt to extend to other organs, particularly to the peritoneum, where it causes that adhesive inflammation which of itself is quite characteristic. Where syphilitic cirrhosis exists it may be more or less advanced. Indeed, its presence may only be revealed by a slight scarring of the free surface and some thickening of the hepatic capsule. Such pathological conditions may serve to fix a diagnosis post-mortem where there has been no syphilitic history and where signs and symptoms during life left one in reasonable doubt as to the etiology of the case. Inasmuch as syphilis of the liver is a late form of the disease, I have known instances where the patient seemed almost oblivious of his ever having had it, and where he could only with some difficulty be made to understand any connection between his previous history and his actual symptoms. I am now having in mind educated and fairly intelligent men of the world. This is a practical observation of importance from the point of view of insistence upon antisyphilitic treatment at times, even though the patient is skeptical and disposed to resist or follow out his own impressions of his ailment. No organ at times becomes more important in the history of hepatic cirrhosis than the heart. As soon as it shows symptoms even of dynamic inefficiency immediately there is a tendency to venous stagnation, which must promote growth of fibrous tissue and development of ascites. Alcohol, as we know, affects the heart as it does other organs; but here it seems rather, as a rule, to produce fatty or other degeneration of the muscular fibres than deposits in interstitial tissues. No doubt these cardiac changes account for many sudden deaths in syncope, or sudden asthenia otherwise unexplained. Frequent stimulation may tide over some of these attacks, but to be effective it must be employed without delay.

I have already indicated the effect of alcohol upon many abdominal organs. Of course, we can understand if these organs are much implicated their influence upon the rapid march of hepatic cirrhosis is greatly felt. Hepatic cirrhosis is particularly liable to be complicated with acute miliary tuberculosis of some organs, and very many patients die from this rather than the hepatic disease itself. In this way it is shown how imperative it is for these patients to keep up good nutrition and live all the while nearly in the open air. The statements of many observers corroborate this. Thus Osler writes: "In seven of my series the patients died with either acute tuberculous peritonitis or acute tuberculous pleurisy."[1] It is curious, on the other hand, that distinguished and careful clinicians like Flint and Fagge apparently make no note of it.

[1] Ibid. cit., p. 571.

The prognosis of hepatic cirrhosis has usually been most gloomy. Once ascites is revealed the patient's lease of life appears very limited. To-day we are more encouraged and regard certain cases very hopefully. Even in the advanced cases of atrophic cirrhosis we cannot always be sure to what extent some, not to say many, of the liver cells retain good functional power—at all events, power sufficient to help continue good nutrition if attending conditions be treated rationally.

It is recognized generally that we have no remedy which will make disappear the formation of fibrous tissue in the liver; but the ascites may be removed, even in these extreme cases, and allow the collateral circulation to act, with relief, to a certain degree, of the obstructed portal circulation. Then, every time effusion becomes considerable and organs are interfered with in their action through pressure, let paracentesis be repeated.

It has been shown by Fagge that cirrhosis often becomes quiescent before it reaches its final stage.[1] Flint seems to corroborate this view, because he says emphatically that life has lasted months and years after ascites had become developed and been recognized. Even in some atrophic cases of advanced type nutrition is still preserved, and this is always of good augu , because, despite the ascites, it shows some liver cells able to function normally. Of course, there is a possibility in these cases that we have not to do with a true cirrhosis of the liver itself, but with a perihepatitis or chronic peritonitis which was very probably the cause of the abdominal effusion. In this connection I would quote Fagge[2] again to corroborate my statement.

In hypertrophic and syphilitic cirrhosis the prognosis is much more hopeful. In the former case the development of fibrous tissue is of immature form, and occurs more rapidly with intercurrent conspicuous cell proliferation. This rapidly formed connective tissue is never so dense nor is it so destructive to the liver cells as that of the atrophic form of cirrhosis. In these cases there is often relative youth and good nutrition. Hence, from all these standpoints the prognosis is more favorable.

The prognosis of hepatic syphilis is even more hopeful. Of ten cases reported by Einhorn "only one patient died, and even this one had been considerably benefited for five or six months, whereas all the others were either perfectly cured or much improved."[3]

Of course, if cirrhosis could be recognized at an early stage, and before the advent of ascites, the outlook would not be immediately unfavorable. Sometimes we are able to make this diagnosis from

[1] Paper read before British Medical Association, 1883, vol. ii. p. 566.
[2] Practice of Medicine, vol. ii. p. 315.
[3] Ibid. cit.

certain prominent signs or symptoms: the indurated, large liver—an organ enlarged—and also irregular, vascular stigmata on the skin and face, and passing jaundice; an enlarged heart, constipation, dyspeptic symptoms, palpitations, and, it may be, some emaciation. We should act in accordance with the manifest indications, and among these is one primary and essential to correct absolutely—an alcoholic habit, if, as is usual, it has previously existed.

We often meet with combined cases of alcoholic and syphilitic cirrhosis. Some such cases have been known to recover during several years. This recovery was evident through subsidence of the ascites and recovery of the general health. (Cheadle.)

The first and most important indication of useful treatment arises from the point of view of arresting growth of fibrous tissue in the liver, and in this way the preservation of the remaining healthy liver cells. This is accomplished, if at all, by abandonment of the use of alcohol, which cannot be too urgently insisted upon in the great majority of instances. Of course, there may arise states of anæmia, prostration, or great weakness in which a moderate amount of good alcoholic stimulant may be imperatively required, at least for a time, and under such circumstances should surely not be withheld. This must be regarded merely as a temporary necessity, and we must have in view constantly the fact that it has been shown that even if fatty degeneration of liver cells be begun it will often be arrested if alcohol be wholly given up. A judiciously arranged dietary is only of secondary importance, and yet it is undoubtedly true that the digestive organs must be supplied with suitable food products, properly prepared, to sustain active nutrition and to ward off, as far as may be, certain functional or even organic disturbances in part dependent upon auto-intoxication of gastro-intestinal origin. Fats and sugars should be notably diminished in the dietary, for the reason that in the impaired liver functional power is decreased, and is shown especially in its inability for proper assimilation of foods containing many such elements. The simplest dietary of milk, eggs, stewed fruits, well-cooked fresh vegetables, and the lighter meats is of decided utility. Semmola's is the only rational treatment, viz., to reduce the quantity of food to a minimum and give it in a form which will tax the liver cells least. Milk is undeniably the best of all; but when this becomes intolerable, as it often does, eggs and other light food may be added. No doubt some instances of cirrhosis of the liver originate in auto-intoxication from the stomach and bowels. In all instances aggravation of the developed disease may result from it; hence over and beyond appropriate dietary the use of suitable antiseptic remedies like guaiaquin and benzosol (Gasper) may be formally indicated. Among drugs which have a decided action, and one most beneficial in almost all syphilitic cases, iodide of potas-

sium easily ranks first. There can be no question, in view of very many recorded cases, that gummata in their early stages are reabsorbed through its action. It is highly probable, also, that perihepatitis and similar conditions of other abdominal organs (spleen, peritoneum) are very favorably affected. It is not a sufficient reason to proscribe the use of the iodide because the syphilitic nature of the case is not always perfectly clear. In many instances doubt may legitimately exist. Indeed, in many combined alcoholic and syphilitic cases a positive differential diagnosis as to how much is due to alcohol, how much caused by syphilis, is impossible. The only safe rule, then, is to give up alcohol and take the iodide. Again, in instances where there is no history of syphilis and no evidence discoverable of its presence, it is yet wise at times to administer the iodide, the reason being that purely alcoholic[1] cases and those due to syphilis of the nature of an interstitial hepatitis are often confounded one with the other.

In the event of evidences of heart weakness, and in view of the well-known post-mortem findings, digitalis and heart tonics should be employed judiciously. Salines and diuretics are of some use in the relief of ascites, but, as a rule, are of more value in warding off its return for a while after paracentesis than in preventing the necessity of this operation. The explanation of this is not perfectly clear, although a theory for it may be readily offered, viz., that the absorbents relieved from pressure are more efficient.[2] Very active purgation by the use of hydragogue cathartics is at no time indicated, as it is useless and may become directly injurious by depleting the patient's strength very much or by bringing on diarrhœa often difficult to arrest. On the other hand, the moderate use of mineral waters to keep the bowels regular may be very necessary to the patient's welfare.

In the treatment of hypertrophic cirrhosis Nothnagel has wisely insisted upon small, repeated doses of calomel. Vaughan believes that later this form of disease will be treated mainly by surgery, as it is the only way by which the gall-bladder and biliary vessels can be disinfected.

Billings quotes Kussmaul as using chloride of ammonium to prevent proliferation of the connective tissue cells, and he (B.) claims in this way he has seen induration of the liver disappear as well as some local symptoms connected with the disease.

Whatever may have been the objections in former years to paracentesis, legitimate or unsupported, to-day it seems very clear that in early and repeated paracentesis the best hope of the patient lies. Even in

[1] Of the frequency of this form, one may judge from Flexner's report of autopsies done at the Philadelphia Hospital. Among eighty-eight cases of syphilis of the liver, forty had interstitial hepatitis.—Medical Record, October 19, 1901.

[2] Thromboses of the portal vein may cause rapid reaccumulation of ascites.

advanced instances of atrophic cirrhosis life is prolonged and suffering diminished; but in instances where we have an enlarged liver with ascites, which in such cases often occurs when the disease is not far advanced, we get our best results from paracentesis. The fluid may recur in smaller quantity after each paracentesis, and in some undoubted examples, after several operations, no fluid has recurred, and so far as symptoms are concerned, we may properly say a recovery has taken place. This may last for many years. I have had at least one such instance in my practice. The patient recovered from the ascites, and subsequently died of another disease than hepatic cirrhosis, as was evident at the autopsy. The danger to-day of peritonitis arising from paracentesis is very slight, indeed, if ordinary aseptic precautions be observed. I do believe it is wiser to employ the ordinary aspirator or Flint's modification of the Davidson syringe, than the trocar and canula, and mainly because the flow of fluid is easily regulated, and thus there is less danger of syncope or heart failure, which might be directly caused by too rapid evacuation of fluid where cardiac degeneration is present. This accident may also be obviated, as we know, by the prompt use of a binder as the fluid flows from the abdomen. The binder also is useful in delaying return of ascites. There is less risk of serious injury to the intestines with the small needle attached to the aspirator than with a moderate-sized trocar.

Unfortunately, paracentesis is not always thoroughly satisfactory. The canula may become blocked in different ways and for different reasons, not always easy to obviate. In our very desire to benefit our patient and withdraw most of the fluid from the cavity we may run the risk of wounding the intestine. Sometimes the cause of the obstruction of the canula is a piece of false membrane; again it seems to be the intestinal wall, and we must be careful not to injure it. In some instances where we expect to obtain a large quantity of fluid we really get very little, which is discouraging both to patient and physician. Occasionally it seems as though the posture of the patient was responsible for this, but I have found the difficulty to arise when the patient was sitting up and also when the patient was lying down.

Some authors have objected to paracentesis because, they say, after it the ascites recurs more rapidly, and that, besides the risks alluded to, it is very depressing through loss of albumin from the blood on every occasion it is performed. This objection has little or no value. as a rule, especially if the patient be in fairly good general condition, Of course, if the patient is very old and feeble, or the disease very advanced, paracentesis is likely to hasten the fatal termination. On the other hand, where the abdominal and thoracic organs have been

[1] British Medical Journal, 1883.

compressed or pushed away from their normal position by excess of abdominal fluid there is no question that the fluid should be speedily removed. Thus great distress is often relieved, the kidneys begin to function with renewed activity, and the general condition of the patient is notably improved. The lungs are enabled to breathe freely again, and the heart becomes regular and fails to intermit. While getting additional power very rapidly, cough, expectoration, hypostasis, and even pleuritic effusion due to upward pressure soon disappear. Sometimes after paracentesis there is more or less leakage from the abdomen through the hole made with the needle or trocar. This is often very annoying to the patient, as his clothes and bedding become thoroughly wet; and yet it may be useful in a few instances from the fact that the drainage continues for several hours after the operation is concluded, and from regions the needle could not reach. In this connection it is proper to refer to continuous abdominal drainage by means of a permanent canula left in the abdomen after the trocar is withdrawn. I performed this operation on one occasion, with apparently some good result; but the dangers from aspiration of air into the cavity, peritonitis, and suppuration are such that I felt later that better ultimate results could be expected from repeated puncture and before the fluid was permitted to reaccumulate in too large quantity, or caused any notable distress, or interfered much with the healthy function of any important organ.

"The removal of fluid by continuous drainage has been practised with some success by Dr. Caille and Dr. Elliot in America, and by Dr. Urso in Italy."[1] And certainly in some cases it would appear to be safer and quite as effective as the radical operation to produce new anastomoses.

On the other hand, Weir,[2] who used permanent drainage in connection with or rather subsequent to the radical operation, "would hereafter prefer to resort to paracentesis if it became necessary, as the risk seems less."

It is surprising at times to remark the powerful diuretic effect of paracentesis. Kidneys that previous to it were inactive become active, urine that was albuminous, of high specific gravity, and contained casts accompanied by uræmic symptoms, has changed remarkably. The flow of urine has wonderfully increased in quantity, and its characters have become almost normal, while all uræmic evidences have soon disappeared. Without the paracentesis both purgatives and diuretics seemed wholly worthless to produce these much-desired effects.

If we wish to get the best effects from repeated tapping we must have patients under our immediate care, so that they may be tapped again

[1] Cheadle, p. 88. [2] The American Journal of the Medical Sciences, 1899, p. 723.

when the proper moment arrives. Tapping should be repeated in proper cases until fluid ceases to reaccumulate. During this period it should be our effort to maintain the patient's nutrition to the highest degree possible. Through constant care and attention we obtain the best results; through carelessness or permitting the patient to absent himself too long from observation we have often cause for regret, and the patient relapses into an impoverished and threatening state.

On the other hand, Hale White's observations would go to show "that in the cases of cirrhosis of the liver with chronic peritonitis the survival for a considerable length of time was due to the fact that the latter lesion assists in some way in the formation of a collateral circulation."[1]

Now, as Osler writes: "We know that extreme grades of contraction of the liver may persist for years without symptoms when the compensatory circulation exists. The so-called cure of cirrhosis means the re-establishment of this compensation."[2]

Upon this idea of re-establishment of this compensation rests the modern radical surgical treatment of cirrhosis of the liver. The method is to promote adhesions between the liver, spleen, and abdominal walls and diaphragm, thus helping collateral circulation by new vascular channels. This is attempted, first, by completely evacuating the abdominal contents, and then, by thorough scrubbing of the organs referred to, set up a certain amount of irritation which shall tend to make the formation of new vessels more probable. In this connection Cheadle is of the opinion that if we consider the conditions where the new vessels are found naturally they do not seem favorable, being associated with the worst cases, and do not lead one to try to produce them artificially. Opposed to this view we would cite three cases cured: one of Osler's,[3] operated on by Dr. Bloodgood at Johns Hopkins Hospital; another of Brown's,[4] another of Frazier's.[5] In one instance under my care, operated on by Dr. F. H. Markoe, nearly two years ago, the patient has had recurrent ascites, necessitating repeated tappings since the radical operation. Two of Osler's cases were unsuccessful. As regards one or two tappings after the operation, this we should expect where a drainage-tube has not been introduced, the reason being that time is required for the formation of adhesions and new veins; and the introduction of the drainage-tube is now shown to be bad from a surgical standpoint, as it opens a channel of infection. (Frazier.)

In Dr. Brown's successful case, at first referred to in the *Presbyterian*

[1] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1901, p. 259.
[2] Ibid. cit., p. 566.
[3] Ibid. cit., p. 577.
[4] New York Medical Record, October 19, 1901, p. 637.
[5] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, December, 1900, p. 661.

Hospital Reports for 1900, and the patient subsequently presented at a meeting of the New York State Medical Society, held October 16, 1901, at the New York Academy of Medicine, the condition was one of atrophic cirrhosis, due to alcohol. There was no syphilis and no malaria, although the spleen was enlarged. There was no pronounced venous engorgement on the abdominal walls. The patient was operated upon over two years ago. There has been no recurrence of ascites, and the nutrition remains good. The patient is doing his usual work—that of a day laborer.

Frazier[1] in the remarks he makes, prompted no doubt by a successful case, wisely insists, as a *formal* contraindication to the operation, upon the absolute lack of functional power in the liver cells—*i. e.*, shown usually by extreme atrophy. (Packard.) In his judgment, the presence of cardiac and renal degeneration is only a relative contraindication. He also states that it is essential, in order to avoid fatal toxæmia, that the collateral circulation should be formed gradually. Where the cases have been carefully selected he "believes the operation has a future."

Fourteen cases are thus far reported, seven of which appear to have been materially benefited or cured by the operation (Brown) and three died from the operation.[2] "The many instances of practical cure following tapping, and the uncertainty of the exact pathological state of the liver, together with the somewhat formidable character of the operation and liability of infection, invest the operation at present with a large element of doubtful expediency."[3] These remarks, cited textually from Dr. J. D. Bryant's work on *Operative Surgery*, appear to me eminently wise.

In all these cases, moreover, it is judicious to properly estimate the amount of functional disturbance, if possible, of the liver cells (icterus, acholic stools, urobilinuria, etc.) as well as the physical changes of the liver itself. In it may be found, as Brown says, a formal contraindication to the wisdom of the operation. Neumann[4] also wisely insists "that the liver cells be not too greatly impaired in their functional capacities, and that every precaution should be taken in selecting proper cases, in order not to permit discredit to fall upon so valuable an operation."

Brown "feels assured that the great risks attending operations on advanced and failing cases will be notably wanting in similar procedures applied in earlier stages of the disease."[5] No doubt this state-

[1] Loc. cit.

[2] Later Packard reports twenty-two cases, with nine recoveries and eight deaths (THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1901, p. 265), and in a "note" one death—one doubtful.

[3] Bryant, Operative Surgery, 1901, vol. ii. pp. 802, 803.

[4] Quoted by Brown (p. 11).

[5] Page 16.

ment is correct, but in my judgment it is correct only so far as it applies to all important or dangerous surgical procedures. The great difficulty is to convince the pure physician with the facts as reported up to date, and allowing for errors of diagnosis with respect of the precise nature of the liver condition and for the concomitant conditions almost always present (heart, kidneys, spleen, pancreas, etc.) that such a stand is justified. I am scarcely of that opinion until it be shown that the radical operation in similar instances gives better results than the far less serious procedure of simple and repeated paracentesis.

Dr. Weir's standpoint appears to be a more rational one, viz., "The operation was worthy of trial in apparently hopeless cases of liver cirrhosis in which the abdomen rapidly refilled after repeated tapping, and in which the large quantity of the fluid was producing fatal exhaustion."[1]

Dr. McBurney in discussing Dr. Weir's paper thought that analogy with what occurred after simple incision in cases of tuberculous peritonitis allowed one to question whether the relief of ascites in cirrhosis of the liver which followed the radical operation was brought about by the development and growth of vascular anastomoses. This view of McBurney's seems to approximate that of Dr. Osborne, of New Haven, and of Dr. Cheadle, already cited.

On the other hand, Packard and Le Conte[2] claim that "one of the ways by which repeated tappings may aid in the recovery of cases of cirrhosis of the liver is through the formation of adhesions similar to those aimed at in the operative procedure, but to a less degree." Be these views as they may, I cordially assent to their previous statement,[3] that "these cases of advanced cirrhosis of the liver, operated on or not, die with evidence of progressive toxæmia and gradual failure of all the organs to do their proper work."

Despite these views, they state in their conclusions, as their opinion, "that where the diagnosis of pure portal cirrhosis of the liver can be made, and where persistent and well-directed medical treatment is productive of insignificant results, the operation should be strongly recommended."

Here, it seems to me, the great difficulty lies in this precise diagnosis at the present time; for do we not know that constantly our autopsies show that concomitant lesions exist which render nugatory all radical operations—*i. e.*, other kinds of cirrhosis, chronic peritonitis, advanced degeneration of other organs, like the heart and kidneys, etc.?

There can be little doubt that in very many cases of hepatic cirrhosis it is important to do what we can medicinally and otherwise to

[1] New York Medical Record, January 28, 1899, p. 143.
[2] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1901. [3] Ibid., p. 257.

keep the heart in a vigorous state. Once it becomes inefficient functionally, either because of simple dynamic weakness or owing to structural changes, the development of the ascites is certainly more rapid and more apt to recur. We recognize in this way that the obstructed portal circulation due to fibrosis is also heightened notably by venous stagnation caused directly by impaired heart power. No doubt the explanation of instances of early effusion in hypertrophic cirrhosis is thus often satisfactorily given. If such a view be admitted it can be readily understood why we can obtain good effects from suitable treatment in just such cases. An important part of this treatment must be the maintenance of sufficient cardiac power if it be possible to prevent venous stagnation in the liver.

In instances where venous stagnation occurs of cardiac origin the hepatic veins at the centre of the lobules are especially affected, and it is also true in these instances that here is likely to be formed the fine fibrous deposit which, as we have seen, characterizes hypertrophic cirrhosis. Not always is the cardiac inefficiency shown by evident physical signs, nor, indeed, by the presence of ascites; still, in hypertrophic cirrhosis or simple engorged liver it is a safe plan to give, for a while at least, small, repeated doses of digitalis, and note its obvious effects either on the size of the liver directly or some of the suggestive symptoms connected therewith.

Appended are histories of cases of "omental anastomosis."

Case I.—Case of cirrhosis of the liver in which radical operation was performed by Dr. F. H. Markoe. J. S., aged fifty years, married; hotel steward; born in the United States; admitted to St. Luke's Hospital June 30, 1898. Alcoholic history; suffering from ascites. Liver probably enlarged; rough and nodular. Abdomen much distended; evidences of fluid; superficial veins enlarged.

First Aspiration. Three days after admission, 125 ounces obtained; second: eleven days later 128 ounces obtained.

Treatment nil. Left hospital July 22, 1898; re-entered, December 6, 1898.

Abdominal fluid increased in quantity as compared with quantity before the last tapping, July, 1898.

Third Aspiration. Two days after admission, 370 ounces obtained; fourth: five weeks after admission, 400 ounces obtained; fifth: seven and a half weeks after admission 440 ounces obtained; sixth: ten and a half weeks after admission, 475 ounces obtained.

Treatment. Digitalis, iodide of potash, theobromine, copaiba, etc. Left hospital March 1, 1899, and readmitted two weeks later; abdomen greatly distended.

Seventh Aspiration. Day after admission; 390 ounces obtained. Left hospital, and readmitted April 17, 1899.

Eighth Aspiration. Day admitted; 426 ounces obtained.

May 13th. Ninth: 390 ounces obtained.

June 14th. Tenth: 450 ounces obtained.

July 10th. Eleventh: 330 ounces obtained.

August 12th. Twelfth: 452 ounces obtained.
October 7th. Thirteenth: 520 ounces obtained.
November 14th. Fourteenth: 510 ounces obtained.
Treatment. Codeine for cough.

January 22, 1900, Dr. F. H. Markoe performed upon the patient the operation of "omental anastomosis," and 500 ounces of light yellowish fluid slowly evacuated from the abdomen. On palpation, the liver was found large; also some abdominal adhesions. Vomiting of green fluid off and on for six days following operation.

Fourteenth Aspiration. Six weeks after operation; 138 ounces obtained.

Subsequently, up to November, 1901 (twenty-two months later), patient has been aspirated about fifteen to seventeen times, which, with those performed before operation, make about thirty in all.

November, 1901. He is now confined to bed, and is unable to leave it by reason of asthenia.[1]

CASE II.—A second case of "omental anastomosis" for cirrhosis of the liver was performed by Dr. F. H. Markoe at St. Luke's Hospital, April 27, 1901. The patient had marked ascites; was a boy, aged thirteen years, and had been quite a drinker. Subsequent to the operation the patient was tapped once before he left the hospital, on May 21, 1901. Since that date he has returned about every six weeks to have the fluid removed from the abdominal cavity. The patient's general condition is about the same as before the operation. The ascites is probably somewhat less.

CASE III.—The following case of "omental anastomosis" is one in which Dr. F. W. Murray operated.

History. P. A. B., married, aged forty-eight years; no specific disease; excessive alcoholic habits.

Four months before admission to St. Luke's Hospital patient noticed yellow conjunctivæ and loss of flesh and strength. His abdomen increased by eight inches in size. This increase subsided for a time under calomel and salines, but soon returned. April 2, 1900, entered hospital; 328 ounces of fluid removed by tapping; largely reaccumulated in two or three days. Transferred to surgical service April 18th.

Abdomen measured 44½ inches at a point three and a half inches above the umbilicus; percussion flat over the whole abdomen. Operation April 19th, by Dr. Murray. Incision four inches long at the left of the umbilicus; 3¼ gallons of fluid removed; omentum thickened and vessels injected; sutured to parietal peritoneum by five interrupted sutures of No. 1 catgut; stood operation well. Urine acid; specific gravity, 1020; slight trace of albumin; no sugar; few hyaline casts.

Aspirated April 23, and 64 ounces of fluid obtained. April 30th, circumference 39 inches. May 2d, primary union of wounds. May 12th, œdema of feet; stuporous; pulse rapid; coryza marked; erythema over nose, diagnosed as erysipelas. May 13th, temperature between 98.3° and 99° F. Pulse varies from 90 to 100. Respiration, 24. Died. (Above history furnished by Dr. Martin.)

NOTE.—Since writing the foregoing paper a valuable contribution from the pen of Dr. George E. Brewer, on "The Surgical Treatment

[1] Patient died December 15, 1901, from heart failure.

of Ascites Due to Cirrhosis of the Liver," has been published. From it we take the report of " 5 personal cases and analyses in tabular form from about 50 more from the literature." From reviewing these statistics Brewer finds at least 6 patients who have been cured of ascites by this procedure—*i. e.*, Talma-Morrison operation—and who have remained well for two years or more; 6 others have died, with relief of this symptom from two to six months before death, or who had not been under observation long enough to demonstrate a permanent cure. Another patient suffering from hemorrhage of the alimentary canal was promptly cured by this operation. Many others have been materially benefited; 38 have recovered from the operation; and, considering that the great majority of these were within a few weeks of inevitable death, he thinks that it should encourage us to suggest operation at an earlier and more favorable stage of the disease. If this suggestion is followed he believes that statistics will show a great improvement over those he is able at this time to present."[1]

In a later contribution on this subject Dr. W. Murrell, of Westminster, writes[2] that " much depends on careful selection, and the best results would probably be obtained in the pre-ascitic stage when the diagnosis rests on the alcoholic history, with hæmatemesis and enlargement of the liver and spleen."

A CASE OF MULTIPLE MELANOTIC SARCOMA UNSUCCESSFULLY TREATED BY X-RAYS.

By James P. Marsh, M.D.,
SURGEON TO THE SAMARITAN HOSPITAL, TROY, N. Y.

The X-ray treatment of various malignant diseases has been used long enough to thoroughly establish the great utility of the method in certain cases and locations. For the ordinary slow-growing epitheliomata of the skin the X-rays are practically specific if the treatment is instituted before glandular involvement has occurred. In my own cases I have not failed to apparently entirely eliminate this disease in from eight to twelve sittings of ten minutes each—I say apparently, because the time elapsed has not been sufficiently long to call the condition a cure; and the X-ray therapeutist should be willing to apply the same three-year rule to his work as does the general surgeon.

But however firm, therefore, our conviction that the X-ray is of inestimable value in the above-mentioned conditions, there is an equally strong feeling that certain malignant tumors have been made

[1] Journal of the American Medical Association, February 22, 1902, p. 135.
[2] Lancet, June 7, 1902, p. 1604.

worse thereby. Several times during the course of X-ray treatment of cases of recurrent cancer of the breast I have felt that, although the local condition has been much benefited, metastases in the internal organs occurred much more quickly than they used to do under the old methods of treatment. So strong had this feeling become that I had decided to have the question of leucocytosis investigated during the time of X-ray treatment as soon as a suitable case should present. As such a case has just passed through my hands, and as the blood examinations show a steady fall in the number of leucocytes with each treatment, I have thought the case worthy of being placed upon record at once. As it is a case of a fortunately rare disease, and intrinsically interesting, it is reported somewhat *in extenso*.

C. H. M., referred to me by my friend Dr. W. J. Hunt, of Glens Falls, N. Y., entered my service at the Samaritan Hospital, July 2, 1902. He is of the white race, aged fifty-two years, and by occupation a teamster. He was born in the United States, and is married.

He complains of numerous tumors upon various parts of his body, but mainly upon the left side of the back, overlying the left scapula and extending thence into the axilla and around upon the forepart of the chest; of pain in the left shoulder, and of limitation of motion in the left shoulder and left arm.

The patient's father died at the age of sixty-three years, of consumption, and his mother died at the age of sixty-four years, of apoplexy. His only brother died at the age of twenty-two years, of rheumatism, and he has one sister who is living and well. No family history of tumor or cancer can be obtained.

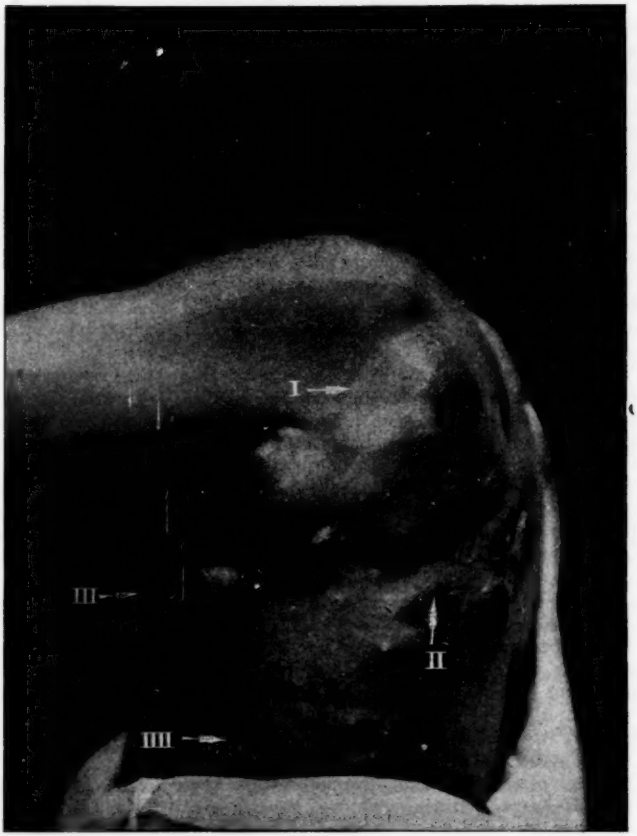
He has had all of the usual diseases of childhood. In adult life he had diphtheria, but otherwise has been well. He has used tobacco moderately, but has not used alcohol. At twenty years of age he had specific urethritis, and also again when he was twenty-three. He has never had syphilis. Upon several different occasions he has been confined in the Utica State Hospital for the Insane, for a report of which see below.

His mental apprehension is very faulty; but, according to his own statements his present trouble began about eight years ago, when a small black mole appeared upon his back, in the region of the angle of the scapula. This mole gradually enlarged, and finally, about two years ago, it became so large that the clothing would rub the skin from it, and it would bleed. This was very annoying, and as it had reached a diameter of one-half inch, the patient had it removed on January 1, 1902. He says that the mole was cut off level with the skin, and he is sure that at that time there were no tumors anywhere on his body. This operation, patient says, was done under cocaine, and that immediately thereafter the tumors appeared in the axilla and upon the front part of his chest. About one week after the first operation the mole was again excised, skin being taken with it at this time. On January 24th he was again operated upon, this time under ether, and the base of the mole and two tumors were taken out. After this operation the original site of the mole did not heal, and the region was again excised, after which it healed.

The patient's present condition is best shown by the accompanying photograph, the measurements being found below.

I. Large mass over scapula, marked I, measured, as the arc of a segment, 16 cm.

II. Subsidiary mass of four nodules, marked II, measured, as an arc of a segment, vertically, 20 cm.; transversely, 10 cm.



III. Axillary mass, marked III, measured, as the arc of a segment, vertically, 16 cm.; transversely, 21 cm.

These masses are firm in consistence and do not fluctuate. Where the skin is stretched tightly over the tops of them they are seen to be of a dark blue hue. At many places over the patient's body are numerous small, freely movable masses, which feel like bullets beneath the skin, and which vary in size from 1 mm. to 1 cm. in diameter, and

they are seen through the skin to be blue in color. A collection of these small tumors is seen in the photograph and marked III.

Physical Examination. The man is of medium height and of fair muscular development, slightly anæmic and slightly emaciated. His expression is anxious.

Lungs. The chest expands symmetrically excepting as regards the growths mentioned above. Palpation and percussion are negative. Auscultation reveals submucous râles throughout the left lung and in the lower lobe of the right lung.

Heart and Arteries. The arteries are slightly atheromatous. The superficial area of cardiac dulness is 7 cm. vertically by 4 cm. transversely. Obliterated apex-beat is found in the fifth space, inside the nipple line. All valvular elements present and in normal position. There are no murmurs.

Liver. Dulness begins at the sixth rib and extends downward 10 cm. to the free costal margin.

Abdomen. Nothing abnormal can be discovered in any part of the abdomen excepting in the left hypochondriac and the left anterior and lateral lumbar regions. The free margin of the right lobe of the liver cannot be palpated. In the left hypochondriac and the left anterior and lateral lumbar regions is a mass, estimated to be about 10 cm. in diameter, which does not blend with the liver dulness. There is no splenic dulness in the normal position. The most prominent part of this tumor is situated midway between the left anterior axillary line and the left nipple line, and is on a level with the umbilicus. There is no area of tympanitic resonance between said tumor and the muscles of the back. Over the most prominent part of the tumor it is dull, and this dulness shades off into the general tympanitic resonance of the abdominal cavity. When one hand is placed in front and the other in the loin the tumor lifts easily, but its range of motion is not great. Its margins are thick and rounded, and no notch can be felt therein.

Nervous System. Patient's mental comprehension is very much delayed. The cranial nerves are intact. The superficial and deep reflexes are present. Sensation is normal. All of the muscular movements are normal.

Diagnosis. Multiple melanotic sarcoma.

Through the courtesy of my friend Dr. E. G. Stout, of the staff of the Utica State Hospital, I am able to furnish an abstract of the history of this patient while in that institution.

Case No. 21,801. Admitted into this institution for the seventh time on July 24, 1901, the diagnosis of the mental trouble being recurrent mania. After his last discharge the patient had been well behaved and steadily employed until July 17, 1901. Upon that day, after having spent several days at work in the hot sun, he became noisy, talkative, restless at night, and very much excited. He would change his position with great rapidity, glance about him in a suspicious manner, and talk to himself at times in a loud tone of voice. These were the only symptoms which he manifested. Upon admission to the hospital he was quite excited, talked to himself, glanced about the room as though he were in fear of some person, and was unable to make an intelligent reply to a direct question. For some days he continued in

an excited and restless state, and was unable to concentrate his attention upon any work or pastime. At table he would play with his food or throw it about the room. In the course of a month or two there was a gradual improvement in his condition, and he was, in October, transferred to one of the farm colonies about a mile from the central hospital.

On January 10, 1902, the patient was anæsthetized and twelve enlarged glands were removed from the left half of the thoracic wall and the left axilla. Two of these glands were adherent to the skin, and in the neighborhood of one lying near the ninth dorsal vertebra, and to its left, was a growth almost one inch in diameter and of a friable character, which bled profusely. A large gland situated near the posterior border of the axilla at its base was closely adherent to the skin and somewhat inflamed. The same was true of three glands situated just external to the growth mentioned above. The axilla was thoroughly cleansed of tumefied tissue, and so much traumatism had occurred in the process that it was deemed best not to close the wound. It was not possible to approximate the edges of the wound when the skin had been removed. The wounds gave no special trouble and were healed at the end of three or four weeks.

On February 21 a case note states that the growth near the inner border of the scapula has again made itself troublesome by reason of its increased size. It was to-day removed, the patient having had the region anæsthetized by means of cocaine injections. At the same time a subsidiary growth a short distance below was taken out. The main growth was about the size of an English walnut, and the lesser one about the size of a bean. Again on March 20th, a case note states that secondary growths are making their appearance at all the points at which they formerly existed, excepting that in the middle of the back. The axillary glands are very hard, and are adherent to the skin.

April 19th. Tumors have increased in size very markedly, and patient is now inconvenienced by wearing his sleeve on his left arm.

On April 24, 1902, he was discharged from the hospital, having regained his usual mental condition.

Examinations of his urine upon several different occasions showed it to be normal.

During his stay in the hospital there was an evening temperature of from 99° to 99.8° F. His pulse rate varied from 82 to 108, and his respiration from 20 to 30.

He entered the Samaritan Hospital June 30, 1902, and he received his first X-ray treatment the same evening. As the technique employed was the same during each treatment I will give it but once.

The patient was placed upon his right side, the left arm being carried out from the body as near to a right angle as possible, in this way bringing the hemisphere of rays upon as many of the growths as was possible. A lead mask was placed over the face. The source of energy was an ordinary 110 volt, direct current. The coil was a twelve-inch Queen to which about three ampères of current were supplied. The tube was a Sayen tube, the surface of which was placed about two and one-half inches from the surface of the nearest growth. The vacuum of the tube as measured in air was six inches, time, ten minutes, with target over the tumor marked I in the photograph.

Herewith are presented the dates of the exposure and the blood examination following:

June 30th. First X-ray.
July 2d. Hæmoglobin, 60 per cent.; leucocytes, 22,500.
3d. Second X-ray.
3d. Hæmoglobin, 62 per cent.; leucocytes, 17,812.
5th. Third X-ray.
6th. Hæmoglobin, 63 per cent.; leucocytes, 16,000.
7th. Fourth X-ray.
8th. Hæmoglobin, 65 per cent.; leucocytes, 14,500.
9th. Fifth X-ray.
10th. Hæmoglobin, 63 per cent.; leucocytes, 12,000.

A note of this date says: "A great many more tumors have appeared, and those that were present have increased very much in size and in darkness of color. The patient has become very much weaker, and has to have hypodermics of morphine to relieve the pain arising from the above-referred-to growth in the abdominal cavity."

It seemed as if the X-ray treatment was having a direct detrimental effect, and in the interest of the patient it was discontinued. The patient was accordingly discharged from the hospital unimproved July 14, 1902.

When in Philadelphia, in March, 1902, my friend Mr. Wilbert, of the German Hospital, expressed himself to me as having a very strong conviction that large, rapid-growing sarcomata were accelerated in their growth by the application of the X-rays, and it occurred to me at that time that possibly it would be found that in these cases the leucocytes, the natural defenders of the organism, were rapidly diminished by the employment of the rays. This apparently is what did occur in the case above detailed. To be sure one case does not constitute a rule, but I would earnestly urge X-ray therapeutists to have their work in this class of cases checked up by a frequent examination of the blood, especially as regards the leucocytosis. It also seems to me that our physiological friends should furnish us with a careful study of the effect of the X-rays upon the blood condition of the normal individual.

MIXED TUMORS OF THE THYROID GLAND.

By Leo Loeb, M.D.,
of Buffalo, N. Y.

(From the New York State Pathological Laboratory, Buffalo, N. Y.)

Mixed tumors have been found in the following places: in the ovary and testicle, in the kidney, and in the salivary and lacrymal glands. They have also occasionally been found in the cervix uteri and in the vagina, in the bladder, and in other places. It will, therefore, be seen that mixed tumors occur mainly in glandular organs. It is further noteworthy that the mixed tumors in the various glands have, within certain limits, each their characteristic constituent tissues.

The mixed tumors of the generative glands are the most complicated ones, containing frequently parts of different organs and tissues. The kidney tumors contain glandular structures situated in sarcomatous tissue, and frequently striated muscle fibres. A combination of cartilage and epithelial or endotheliomatous formations is characteristic of the tumors of the salivary glands. The mixed tumors have always had an especial significance in so far as their existence served as an argument in favor of the origin of tumors generally from displaced embryonal cells. Wilms especially has lately reviewed the mixed tumors of different organs, and has tried to show that they are all essentially of the same nature. He explains all mixed tumors as originating from embryonic cells, either actually displaced or at least functionally detached from their normal environment. These cells may later on give rise to mixed tumors. The different tissues found in one mixed tumor are, according to him, all derived from cells ceasing to develop at one stage of embryonic life. The earlier this stage is the greater is the variety of tissues these cells are able to produce; and each cell has the power to produce a tumor-like formation containing all those cells which also in the course of normal development would have been produced by it. This conclusion does not seem to be absolutely justified by the facts gained by experimental embryology. It presupposes that each embryonic cell has only (to use a term of Driesch) that *prospective potenz* which under the conditions of normal development it really displays; therefore Wilms assumes that a mixed tumor of the kidney —*e. g.*, which consists of gland structures (of mesodermal origin) and of striated muscle fibres—must be derived from cells of an embryonic stage, where the differentiation into the Wolffian body and in the myotome had not yet taken place, therefore, from what he terms a "mesoderm cell." This assumption presupposes that a cell even under changed conditions of development can only give rise to the generations of cells it would have formed under normal conditions. This, however, does not seem to be the case. It is well known that isolated blastomeres up to the sixteen-cell stage proceed in their further development not as parts of a whole organism forming the specific tissues or organs they would have produced if they had remained in connection with the other blastomeres, but they continue to develop as whole embryos. An ovum developing under the influence of one-sided pressure gives rise to normal embryos; also no specialization of the first blastomeres under these conditions seems to have taken place. Experiments with the injection of teased embryonal tissues into adult animals (Féré, Birch-Hirschfeld and Garten, Galleotti and Ville Santa) are not conclusive in their results with regard to this question. It is uncertain which of the tissues which can be found later on have really developed from cells which would have formed these tissues also under

normal conditions. Of great importance, however, seem to be the recent experiments of Spemann. He found in triton, at a stage when the medullary plate is already indicated, that by tightening a ligature across the medullary plate the anterior end of the posterior part will form a head just as the anterior part will do. Under these conditions ear vesicles can be formed from parts which, if the development had proceeded normally, would not have formed any part of the head. Through injection of isolated cells such structures have not yet been formed. Probably the connection of these cells with a large part of the embryo is necessary for this result. At a somewhat later stage of the embryonic development a new head is not formed at these places. So much can be concluded from these experiments that the "prospective potenz" of embryonic cells under certain conditions is larger than could be recognized without experimental tests. *It is therefore at present not possible to determine from the composition of a mixed tumor from what kind of embryonic cells such a tumor is derived. It also proves that heterotopic formations are not of necessity produced by displaced blastomeres.*

Mixed tumors may from the beginning be malignant, or may after an apparently benign period assume this character. The facts known at present do not offer any explanation for malignant growth. Experimentally, displaced embryonic or adult cells have not been found to produce malignant tumors. Some thus far unknown factor must therefore be added to produce malignant tumors out of such cells if the displacement (or functional disconnection) plays any essential part at all in the production of mixed tumors. Wilms himself admits that some other factor besides the disconnection of cells may have to be present for the production of a tumor, although, at other places, the mere fact that these disconnected growing cells do not find the tension of their normal environment opposed to them seems to be sufficient to him to explain the malignant growth. Further, Wilms believes that all mixed tumors are of embryonic origin, owing to displacement or functional disconnection of embryonic cells, even if these tumors do not manifest themselves until later in life. Because there exist transitional tumors connecting complicated mixed tumors with simple sarcomata, these simple tumors have, according to Wilms, to be explained on the same basis. Wilms does not apply this conception to carcinoma, for which he admits a different etiology. This theory of Wilms as to the origin of *all* mixed tumors from displaced or functionally disconnected cells is, of course, not proven, although it is probable in the case of a number of tumors. There are, however, certain mixed tumors for which this explanation is improbable, namely, the mixed tumors of the thyroid gland.

The mixed tumors of the thyroid gland which I have found recorded

are of two kinds. There are, first, three undoubted cases of mixed carcinoma and sarcoma, and two doubtful cases. I shall report here a further case of carcinosarcoma in which there can be no doubt about the diagnosis. Secondly, I have found records of two tumors composed of sarcomatous tissue and bone.

The cases of carcinosarcoma reported are the following:

Case I.—C. Kaufmann, in "Die Struma Maligna," describes a tumor in a man, aged sixty-seven years. The left lobe of the thyroid presented the appearance of a follicular struma. The right lobe, considerably enlarged, reached from the hyoid to the jugulum, and consisted in the centre of fibrous tissue. Around this fibrous nucleus, and especially toward the trachea, the tumor was a spindle-shaped sarcoma. The periphery toward the right side presented the appearance of a typical carcinoma, occasionally including normal gland structure. The zone where sarcomatous and carcinomatous tissue met was small; the sarcoma cells replaced here the ordinary connective tissue stroma which surrounded the carcinomatous alveoli. The interstices, which were filled with sarcomatous tissue, were enlarged. The carcinomatous alveoli were well defined toward the sarcomatous tissue. There were (metastatic?) nodules present in the periphery of the kidneys.

Case II.—E. Kummer, "Sarco-adénome du Corps Thyroide ayant Simulé une Strumite Simple." The patient, Mrs. P., aged fifty-five years, had suffered for several years previously from a thyroid which slowly increased in size. A month before operation the growth began to increase rapidly. The left lobe of the thyroid only was affected, the right lobe being normal. The tumor consisted in the periphery of vesicles lined with cylindrical cells and including colloid. In the central part there could be found between the glandular parts large fusiform or oval cells separated from each other by very little intercellular substance. This interglandular tissue became larger further away from the periphery. At other places sarcomatous cells only were found, and again at other places only tubules consisting of cylindrical epithelial cells. These tubules were pressed against each other, no connective tissue being present between them, and the membrana limitans being preserved. A vein in the anterior part of the tumor was occluded by a thrombus consisting of fibrin and adenomatous tissue with cylindrical or cuboidal cells. Clinical symptoms suggested the presence of metastases in the lungs. No autopsy, however, could be obtained. From an anatomical point of view, Kummer designated the epithelial part of the tumor as an adenoma and not as a carcinoma, and believes it to be derived from the parathyroid rather than from the thyroid. Clinically, however, it was malignant. Of special interest is the fact that only one lobe, namely, the left, was affected.

Case III.—H. G. Wells, "Multiple Primary Malignant Tumors: Report of a Primary Sarcocarcinoma in the Thyroid of a Dog, with Mixed Sarcomatous and Carcinomatous Metastases." This tumor was found in a Skye terrier bitch, twelve years old. The tumor affected both sides of the thyroid gland. The epithelial part of the tumor consisted of alveoli which were partly filled with colloid material, partly with cells. These alveoli were separated from each other by the ordinary connec-

tive stroma. The sarcoma consisted of spindle cells, mostly arranged perpendicularly to bloodvessels. There were many vessels and many karyokinetic figures present. As a rule, connective tissue separated the carcinomatous and the sarcomatous parts, but in some places the sarcoma infiltrates the carcinoma. In the cervical glands the metastases were carcinomatous. In the lungs, which were filled with metastatic nodules, most of them were pure carcinoma, some mixed carcinosarcoma. Kidney, heart, and small intestines showed sarcomatous nodules.

CASE IV.—A further case I observed in a white rat. I used the sarcomatous part of this tumor for transplantations, and have therefore referred to this tumor in the paper describing the results of those experiments.[1] This mixed tumor was found in a full-grown rat. The

FIG. 1.

tumor, which was hanging from the neck, was about 7 centimetres long, and measured from 4 to 5 centimetres in the other dimensions. This tumor hung so far from the neck of the rat that it touched the ground. It felt solid and moderately hard. About 2 centimetres from the neck, on the pendant portion of the tumor, there was a constriction encircling it and dividing it superficially into two lobes. During the operation the tumor was found to contain a small central cavity filled with straw-colored fluid. The color of the tumor in this region was white. Besides the small central cavity no cysts were macroscopically present. In trying to enucleate the tumor at the neck it was found that it had surrounded important bloodvessels and nerves of the neck, and this

[1] Further Investigation in Transplantation of Tumors. Journal of Medical Research, vol. viii.

fact prevented the possibility of saving the life of the rat. At this time it was observed that the tumor had a somewhat different color at the upper part near the neck, above the constriction; but no special

FIG. 2.

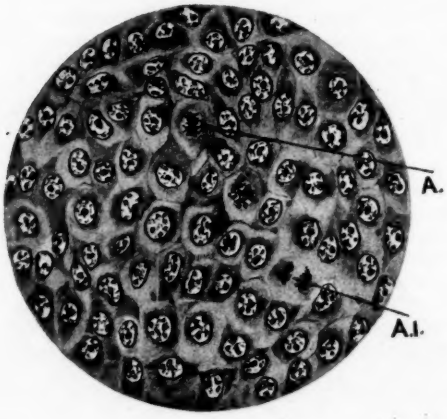
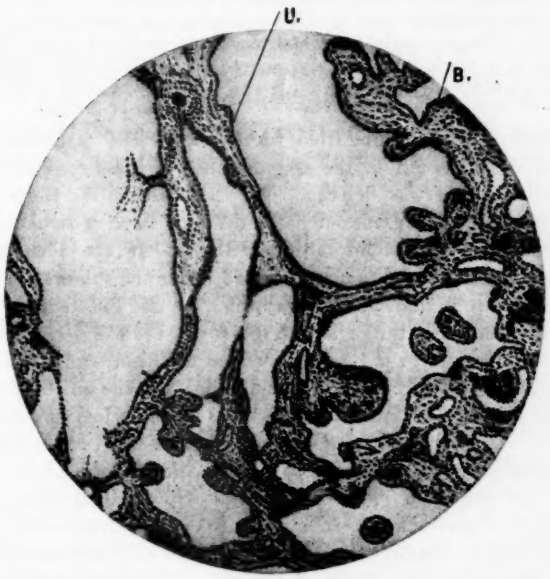


FIG. 3.

significance was attributed to this fact, and no pieces from this upper part were transplanted. Later on microscopic examination showed that the part near the neck (probably the part above the constriction) was adenocarcinomatous, but that the main mass of the tumor, which was white in appearance, was a sarcoma. In one lung a small nodule was found which showed sarcoma-like tissue around a bloodvessel, with mitoses in each section. It is very probable that we have here a beginning metastasis of the sarcomatous part of the mixed tumor of the thyroid. Further microscopic examination of the main tumor showed that the sarcomatous part consisted of spindle cells with, at different places, a somewhat varying amount of intercellular substance. The sarcomatous character was well marked, and at many places

FIG. 4.



mitoses could be seen. At other places some degenerative changes had taken place, the nuclei and cytoplasm disappearing and fibrous stroma only remaining. At such places the cells were frequently well preserved around the bloodvessels, which were thus surrounded by a mantle of cells. There was very little myxoid change present. At some places, however, small areas of softening could be seen. The epithelial part of the tumor consisted of irregularly arranged glandular structures lined with cylindrical or cuboidal cells separated by a stroma moderately rich in cells. At some places two rows of epithelial cells lined the tubules. At many places the connective tissue pushed apparently the gland cells into the tubules, so that an intracanalicular

adenomatous growth resulted. At such places the epithelium frequently became quite flat. The intruding connective tissue was often homogeneous, apparently gelatinous, and stained strongly with eosin. At other places the tubules grew in different directions through the connective tissue, so that little of the latter remained distinguishable. At the margin of some pieces the gland cells filled the alveoli—at least the appearance of alveoli filled with epithelial cells presented itself. The connective tissue surrounded by the tumor cells became necrotic, and then the epithelial masses grew diffusely as a carcinomatous growth into the surrounding tissue. There is no doubt about the malignant character of both the constituent parts of this mixed tumor. The sarcoma made a small metastasis in the lung, and it was continuously growing (mitoses); it was transplanted in a number of generations into other rats. It preserved its sarcomatous character during these transplantations, made contact metastases, and in one case many metastases in the peritoneal cavity. These metastases were always of the same type. The epithelial part had morphologically in some parts the character of a carcinoma, and also proved clinically its malignant character by growing through and destroying the surrounding tissue.

It is difficult to determine from which part of the glandular structures found in the rat in the neighborhood of the larynx the adenocarcinomatous part was derived. We can distinguish there in the normal rat at least four distinct parts, differing in their structure. In one of these only is colloid substance found. In the adenocarcinomatous part of the mixed tumor no colloid inside the tubules was found. We must leave it undecided from which of the different structures around the trachea in the region of the thyroid it was derived.

In this case the large part and the one at the distal end of the tumor were formed by the sarcoma; the smaller one and the one lying on the proximal side of the tumor was formed by the adenocarcinomatous structure. That makes it probable (although not certain) that the sarcomatous part was the one growing first, and that the adenocarcinomatous part began to grow only secondarily. In this connection it might be of interest to state that two other rats from which tumors were obtained for transplanting into rats were only affected by sarcomatous growth in the region of the thyroid. In the case reported here this sarcomatous growth seems to have been followed by an epithelial one.

Besides these four cases there have been reported by Förster, in 1860, two tumors of the thyroid gland, which he described as mixed sarcoma-carcinomata. One of these tumors had metastases in the lymph glands and in the lung. According to Förster, the main tumor consisted of mixed carcinomatous and sarcomatous parts. It affected the whole thyroid. In one jugular lymph gland sarcoma only was found. In a substernal metastasis carcinomatous structures only are said to have been present. In a second case, a man, aged fifty-eight years, this

mixed growth is said to have started in one lobe of the thyroid, which at that time already had been changed into a struma. A metastasis in the manubrium sterni was pure sarcoma. Although it is quite likely that one or both of these tumors were mixed sarcoma and carcinoma, the description is not sufficient to make it certain.

We see from the cases just described that there exist in the thyroid gland a distinct variety of mixed tumors, namely, carcinosarcomata. Although, as we shall see later, one or two similar carcinosarcomata have been described at other places, the thyroid is the only place where such a series of cases of this type of mixed tumor has been described. A certain resemblance to these tumors can be found in some of the mixed tumors of the kidney. There also we find a growth of what appear to be sarcomatous elements and of glandular structures. Metastases have been found from such tumors which contained both the sarcomatous and the glandular elements; so, *e. g.*, a metastasis in the skin, in the case of Vogler. These cases are, however, different from the mixed tumors in the thyroid gland, inasmuch as they are probably always congenital, that the gland structures do not become typically carcinomatous, and that the distribution between the epithelial and apparently connective tissue structures is a different one. The relation of the small round cells surrounding the glandular structures and the latter is interpreted in a different way by different observers. In the mixed tumors of the kidney we usually find a more or less intimate mixture between these two elements; in the mixed tumors of the thyroid it is different. In the cases reported above we find a sarcomatous and a carcinomatous part separated. In Cases I., III., and IV. we find only a small zone in which both carcinomatous and sarcomatous elements are mixed; in Case II. this zone is somewhat larger; still both constituents are in the main separated; in Cases II., III., and IV., and probably also in the two cases of Förster, metastases were present which contained one or the other of the two parts of the tumor; in Case III., also, some mixed metastases were found. In no case were such elements present which, as Wilms believes, can always be found in mixed tumors, namely, growing indifferent cells, which at the same time at the margin of the tumor multiply without any differentiation taking place, and which in the more central parts of the tumor differentiate and give rise to the same tissues which they would have produced under normal conditions in the embryo.

Another question of interest is as to the age at which these tumors occurred. In Case I. the patient was aged sixty-seven years, in Case II. fifty-five years; in Case III. the dog was twelve years old, and in Case IV. the rat was full grown; in Förster's two cases the patients were aged thirty-nine and fifty-eight years, respectively. We see that the tumors were found in patients or animals of advanced age, and

none in quite young individuals. According to the statistics of Morf, sarcoma of the thyroid is also mainly found among older people.

If we now consider the question of the etiology of these tumors we must ask if they can be explained as due to a disturbance of the embryonic development, which, according to Wilms, is at least one of the necessary conditions for all mixed tumors and also for sarcomata, even if they should be found in advanced age. As we saw, none of these tumors occurred soon after birth; almost all were found in advanced age. None of them shows the characteristic embryonic cell from which the other cells are derived by differentiation; the majority of the metastases show only one tissue. None of the conditions proving, according to Wilms, the embryonic origin of mixed tumors is to be found here. It is, however, well known that carcinoma, as well as sarcoma of the thyroid, is frequently preceded by a struma. In Cases I. and II., and in one case of Förster's, the history points to a struma preceding these mixed tumors. In the two cases observed in animals it is, of course, improbable that a slight preceding enlargement of the thyroid would have been noticed. Struma is an endemic disease caused by some condition, thus far unknown, connected with certain localities. This same condition is directly or indirectly in many cases also one of the causes of malignant tumor formation in the thyroid and, as we see also, of these mixed tumors. There exists, therefore, at present, no reason to connect these mixed tumors with irregularities of embryonic development. The widely accepted view that *all* mixed tumors must be explained as due to abnormalities of embryonic development does not, therefore, seem to be sufficiently sustained by facts.

We now have to consider the further question why we find in the mixed tumors of the thyroid gland the combination of sarcoma and carcinoma. Such combinations outside of the thyroid seem to be very rare. I have found one case described by Klein, and one other case reported by Lubarsch, which should in all probability be regarded as sarcocarcinoma.

Case I. — Klein, "Pathologisch-histologische Studie über eine seltene Combination von Sarcom und Carcinom der Nasenhöhle," Dissertation, Würzburg, 1898. This tumor was observed in a woman, aged thirty-four years. After previous bleeding from the nose in 1893 polypi appeared in the left half of the nose. In 1894 the left nasal cavity became entirely occluded. In the beginning of 1895 the left nasal cavity and the nasopharynx were filled with soft tumor masses. They seemed to originate from the base and the posterior part of the nose, and they broke through into the orbita, the oral cavity, and into the alveolar cavity of an extracted tooth. A part of this tumor consisted of an angiosarcoma, with large cells and giant cells. It penetrated, as a round-celled sarcoma, the cartilaginous septum. Pieces from the tumor near the osseous septum showed a carcinomatous character. The epithelium of the osseous septum and of the floor of the

nose was changed into thick, stratified epithelium. Carcinomatous cells penetrated into the Haversian canals.

CASE II.—Lubarsch describes a tumor ("Zur Lehre von den Geschwülsten und Infectionskrankheiten," Wiesbaden, 1899) which he found in the liver of a man, aged seventy-six years. There were adenomatous and carcinomatous parts present. Between the carcinomatous structures masses of connective tissue elements were found which resembled very much sarcomatous cells. The cells were polymorphous and the nuclei hyperchromatic. Some of the tumor nodules consisted almost entirely of sarcomatous structures. The metastases consisted partially of adenomatous and partially of sarcomatous structures, including perhaps some remains of epithelial elements, and, lastly, of carcinomatous nodules, which contained in the periphery much connective tissue. A small metastasis in the serosa of the intestines consisted almost exclusively of sarcomatous cells. Lubarsch believes this tumor to be a true sarcocarcinoma.

The case of Klein resembles the sarcocarcinomata of the thyroid also in this respect, that the sarcomatous and carcinomatous parts were probably mixed only in a small zone. In the case of Lubarsch the relation between the two elements seems to have been a more intimate one. It therefore appears that outside of the thyroid only very few sarcocarcinomata have been reported. Is it entirely accidental that the majority occurs in the thyroid? That is probably not the case. Two facts might be cited which speak against this view: 1. In Cases I. and II., and in one case of Förster's, both the sarcoma and carcinoma affected the same lobe; in the other cases this may also have been the case in the beginning. The tumors were, however, too large when examined to permit a definite opinion about this point. In all cases, however, the two constituents adjoined and penetrated each other to a slight degree only. These facts speak in favor of the view that they originated in the same part and not in different parts of the thyroid. If we had to deal with an accidental occurrence in the majority of these tumors the two constituent parts ought to have started in different parts. 2. The thyroid is distinguished from many other parts of the body by the fact that sarcomata and carcinomata originate there under similar conditions. Frequently in other organs sarcomata are found in young, carcinomata in old persons. In the thyroid sarcomata and carcinomata both are mainly found in older people. Further, the predisposing conditions for sarcoma and carcinoma, as far as they are known, are usually not identical in other parts of the body. In the tongue, *e. g.*, leucoplakia frequently precedes carcinoma. It is not known, however, that leucoplakia favors also sarcoma in the tongue. In the thyroid gland, however, both carcinoma and sarcoma occur in the majority of cases in thyroids previously affected by struma. Further, carcinoma and sarcoma are the most frequent tumors of the thyroid. These facts might help to explain the relative frequency of this com-

bination of tumors in the thyroid gland, which is the more remarkable as the simultaneous occurrence of sarcoma (or endothelioma) and carcinoma even in different parts of the body seems to be rare. Wells collected seventeen cases of this kind. The occurrence of multiple simultaneous carcinoma seems much more frequent. I have observed three double carcinomata in cattle, in which carcinoma is relatively rare.[1] If we consider the great rarity of the combination of sarcoma and carcinoma elsewhere, I think it probable that there are still other factors present which cause the simultaneous growth of carcinoma and sarcoma from the same part of the thyroid. Nothing about the character of these factors can be stated until our knowledge of the causes of tumors in general is more definite. It is also remarkable that this same combination of sarcoma and carcinoma of the thyroid occurs in three different species of animals.

Besides the mixture of carcinoma and sarcoma there have been reported two sarcomata of the thyroid in which bone was mixed with the sarcomatous tissue. 1. Förster reported in a woman, aged sixty years, a sarcoma of the right lobe of the thyroid. In the centre of the tumor true bone was found surrounded by somewhat denser fibrous tissue. The bone seemed to be growing. 2. Pick found in a spindle-celled sarcoma of the left lobe of the thyroid, in a woman aged fifty-one years, bone mixed with sarcomatous tissue. The bone seemed to be growing; osteoblasts were found. At other places parts of the sarcoma assumed gradually the appearance of a tissue poorer in cells, resembling finally osteoid tissue. Similar conditions were present in a metastasis in the lung; other metastases, however, were free from bone. In this case the bone seemed to be formed directly through transformation of sarcomatous tissue. The sarcoma cells preserved their character also in the metastasis.

If we assume, with Wilms, that the sarcoma cells in this case are really not cells of connective tissue of the adult thyroid, but correspond to embryonic cells which undergo partially a further development to bone, we would have to regard these tumors, too, as true mixed tumors, best to be explained by the theory of a disturbance of embryonic development. Against this explanation speaks the fact that bone formation has also been found in struma. (Lücke, Kahn.) It is quite likely that in the case of Förster, cited above, the bone was originally formed in a struma, and that the development of sarcoma was only secondary.

We have no reason to believe that the bone formation in a sarcomatous thyroid must have a cause different from the bone formation

[1] Carcinoma in Cattle, Medicine, 1900. Besides the two cases mentioned here, I observed one case in which both kidneys were affected.

in a struma, especially since a struma so frequently precedes a malignant tumor of the thyroid. There is, however, just as little reason to believe that the bone formation in a struma is caused by irregularities of embryonic development as it would be in the case of bone formation in the valves of the heart or tuberculous foci of the lung.

All these facts and considerations do not exclude the theory that some developmental abnormalities might, nevertheless, have been the cause of the origin of both these kinds of tumors of the thyroid; they prove, however, that the causes adduced to demonstrate such an origin for other mixed tumors cannot be applied to the mixed tumors of the thyroid, and that therefore the fact that a tumor contains, besides the ordinary stroma, more than one constituent, is in itself not sufficient to prove its embryonic origin.

SUMMARY. 1. In the thyroid gland there have been found in man and in different species of animals mixed tumors of the type of carcinosarcoma. All the tumors described so far have certain characteristic points in common. Although carcinosarcomata occur in other places, the majority of them have been found in the thyroid. There also are found in the thyroid gland combinations of new-formed bone and sarcoma. *The facts which have been cited in favor of the embryonic origin of mixed tumors cannot be applied in the case of these mixed tumors. The fact that the tumor is a mixed tumor, therefore, is in itself not sufficient to prove its embryonic origin.* 2. It is not possible to determine with certainty, from the character of the constituent parts of a mixed tumor, from what kind of embryonic cells such a tumor is derived. Heterotopic tumor formations need not necessarily be produced by displaced blastomeres.

NOTE.—Recently T. McCrae (New York Medical Journal, 1902, No. 15) published a case in which the upper part of the left lobe of the thyroid of a female patient, aged sixty-nine years, was enlarged and replaced by an adenomatous new-growth; the lower part presented the structure of a round-celled sarcoma. Metastases of the sarcomatous part were found in the chain of lymph glands extending from the thyroid to the stomach and also in the right lung. The stomach was the seat of a similar sarcoma. Considering the fact that no other abdominal tumors were present, that the same lobe of the thyroid was affected by both tumors, and that the connection between the two neoplasms in the left lobe of the thyroid was the same as in some of the tumors just described, it seems not unlikely that Dr. McCrae's case, which Dr. McCrae himself regards as a primary sarcoma of the stomach, is also one to be classed among the mixed tumors of the thyroid.

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THE PATHOLOGY OF LABIAL AND NASAL HERPES AND OF HERPES OF THE BODY OCCURRING IN ACUTE CROUPOUS PNEUMONIA, AND THEIR RELATION TO THE SO-CALLED HERPES ZOSTER.[1]

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Our knowledge of herpes zoster was very much extended by the recent contribution of Head and Carpenter.[2] These authors showed, among other things: 1. That herpes zoster (in 18 cases, at least) is associated with destructive, and usually inflammatory, changes in the sensory ganglia (posterior root or Gasserian) corresponding to the nerve supply of the part affected with herpes. 2. That in recent cases (before the eleventh day) degenerative changes are not demonstrable in either the peripheral nerves, the posterior root fibres, or the central nervous system. 3. That in cases examined after the lapse of this period degenerative changes are present in these structures and apparently correspond to the affected areas in the ganglia. Their work was based upon the study of 21 cases in all stages of the eruption. They state that before their own work there were only two well-reported autopsies on cases of herpes ophthalmicus (Wys and Sattler) and five satisfactory reports on zoster of the trunk (Lesser, Chandelux and Dubler). Von Bärensprung's oft-quoted case is classified as unsatisfactory, because, though he noted the occurrence of hemorrhage into a ganglion, he failed to mention to which of the three ganglia removed he alluded.

While this valuable communication has placed our knowledge of herpes zoster on a substantial basis, it is clear that more light is needed

[1] Read at the Seventeenth Annual Meeting of the Association of American Physicians, held in Washington, D. C., 1902.

[2] Brain, Autumn, 1900.

upon the etiological factors concerned, as well as upon the identification and classification of the various types of herpes.

In order to clearly understand our present knowledge on the subject, the following summary of the main facts may be helpful. There are a number of clinical and apparently several anatomical types of herpes: herpes zoster involving the neck, trunk, and extremities (following the distribution of the spinal posterior root ganglia); herpes ophthalmicus (following the distribution of the first division of the fifth or trigeminal nerve, Gasserian ganglion); herpes facialis, herpes labialis et nasalis (probably following the distribution of the second and third divisions of the trigeminal nerve, but unsupported at this time by anatomical observations), and herpes genitalis (commonly believed to be due to local irritation and not known to be associated with any lesion of the nervous system).

The herpes facialis, labialis, nasalis, and genitalis are classed by Hartzell[1] as herpes simplex, in contradistinction to herpes zoster of the neck, trunk, extremities, and ophthalmic area (herpes zoster ophthalmicus). These latter forms of herpes have been shown to be identical in that they are associated with the same lesions of the nervous system (especially those of the sensory ganglion), and the changes in the skin are believed to be the same.

It seems further to have been conclusively demonstrated that the lesions of the skin are secondary to the primary changes in the corresponding sensory ganglia, which in turn may be brought about by a variety of causes. The cases, however, may be classified into the primary or spontaneous herpes zoster, in which the affection is apparently primary and not due to any evident preceding infection or injury, and the secondary form, in which there is more or less clear evidence that the disease occurs as the sequel or complication of some antecedent affection, as pneumonia, cerebro-spinal meningitis, etc., or to injury.

Our knowledge of the changes in the skin in the various clinical forms of herpes is far from satisfactory. Not until a sufficient number of careful observations upon the histological changes in all the stages of each variety of herpes is available will we be in a position to compare critically the processes, and, perhaps, distinguish clearly the different forms. Suffice it to say for the present, that after comparing the histological appearances described by various authors of the changes in herpes zoster, herpes labialis and genitalis (all available), with some of my own cases herewith reported, and making due allowances for the different stages of the processes studied, I am not able to find any constant distinguishing characters by which the skin lesions of the various clinical forms of herpes may be separated.

[1] Reference Handbook of the Medical Sciences, 1902, vol. iv.

I have recently had the opportunity of studying two cases which throw some light upon several points of importance in the pathology of herpes. The first case occurred in the private practice of my friend Dr. Edward F. Cushing, who recognized its interest and importance and obtained the autopsy. I take this opportunity of expressing my thanks to Dr. Cushing for the autopsy and for the use of the clinical history of the case. This case illustrates the causal relation between acute infections and herpes zoster, and emphasizes the identity of the lesions of the skin and nervous system in primary and secondary herpes of the trunk.

CASE I. *Summary.* Bronchitis, acute croupous pneumonia of both lungs, herpes zoster of the left side, distributed on the back and side (sixth dorsal), and the abdomen (eleventh dorsal); congestion and hemorrhage into the capsular and interstitial tissue at one side of the eleventh dorsal ganglion, with slight cellular infiltration and destruction of a few ganglion cells; amylaceous and hyaloid bodies in another portion of the same ganglion. Slight chronic and acute interstitial nephritis, acute parenchymatous and interstitial hepatitis, acute splenic tumor, old pericardial adhesions, hypertrophy and dilatation of the heart; fibromyoma uteri.

Clinical History. Miss T., aged sixty-three years, had not been well for about one year. On October 10, 1901, she was taken sick with a cold in the head, which a few days later was followed by bronchitis. She then developed pneumonia of the lower lobe of the left lung. Later the whole of the left lung became consolidated. On the morning of October 24th there were the physical signs of consolidation of the lower lobe of the right lung. Coincidently with the consolidation of the lower lobe of the left lung there developed well-marked herpes zoster in the mid-dorsal region of the left side, extending from the middle line in the back to about the anterior axillary line, corresponding to Head's sixth dorsal area. During the last two days of life a similar eruption occurred on the abdomen, in the left umbilical and iliac regions (eleventh dorsal area; see autopsy protocol). Albumin was present in the urine. Death took place at 2.30 P.M., October 24, 1901. Autopsy six hours later. The autopsy was done hurriedly and under difficulties, at the home of the patient. The body measured 160 cm. long, was sparely built, except over the abdomen and lower portion of the back, where there was a considerable amount of fat. The body was cold, rigor mortis moderate. There were a few reddish discolored areas on the outer aspects of the legs. On the left side of the abdomen, situated in the outer and lower portion of the left umbilical and the upper portion of the left iliac regions there was an area, the size of the palm of the hand, studded with scattered pale-red or gray areas from 3 to 6 or 10 mm. in diameter. Some of these areas were elevated and covered with dry grayish-red material, while others showed a distinct loss of epidermis. No typical vesicles containing fluid were to be found, but the areas had the appearance of dried vesicles. In distribution this area corresponded with Head's eleventh dorsal area. A similar but narrow area extended from the middle line in the mid-dorsal region as far as the anterior axillary line under the nipple,

corresponding to Head's sixth dorsal area. The areas here were larger and the process appeared older than that on the abdomen. No other lesions were found upon the surface of the body. There was no facial herpes.

Chest. The chest was fairly well shaped, the muscles and fat rather wasted.

Both pleuræ were free from adhesions, and the pleural cavities contained no fluid. The visceral pleuræ over considerable areas were covered with a thin layer of fibrin, and were red and lustreless.

Right Lung. The apex was free from puckering and thickening. The upper lobe on section was congested and markedly œdematous. The whole of the middle and a large part of the lower lobe were consolidated, airless, and of a grayish-red color, and granular appearance. The mucous membrane of the bronchi was congested.

Left Lung. The whole lung was consolidated, airless, of a gray or grayish-red color, and granular appearance. The bronchial mucosa was congested. The bronchial glands were pigmented, but free from tubercle.

Heart. The pericardium was adherent to the diaphragm over a large area. Firm fibrous adhesions obliterated the pericardial sac. The walls of both ventricles were thickened. The valves, the coronary arteries and veins, as well as the aorta and large arteries, were normal. The myocardium was pale, otherwise normal; the heart weighed 400 grammes.

Abdomen. The muscles and fat of the abdominal wall were of ordinary appearance. The left lumbar region was prominent. The stomach was distended with gas, the large and small intestines contracted.

Liver. The liver was of ordinary appearance and size. The edges were rounded, the surfaces smooth, consistency not increased. On section the lobules are visible, the surface pale. The gall-bladder and bile-ducts were negative.

Spleen. The spleen was twice the ordinary size. On section it was of a grayish-red color; the trabeculæ and Malpighian bodies visible; consistency decreased.

Kidneys. The kidneys were of about the same size and appearance. The capsules were adherent in places, the surfaces were somewhat granular and marked by a few old scars. On section the consistency was somewhat increased, the surfaces pale, the cortices thinner than ordinary. The arteries, pelvis, ureters, bladder, and adrenals appeared normal, as did the stomach and intestines.

The ovaries were small and tough to the touch. The uterus was considerably enlarged; the body was the seat of a globular fibroma the size of an orange.

Nervous System. The brain could not be examined, and the examination was confined to the lower portion of the spinal cord; from the tenth dorsal segment downward with the cord the eleventh and twelfth dorsal and first lumbar posterior ganglia of both sides were removed. It was not possible to go higher in the time available for the examination. There was an excess of cerebro-spinal fluid, which, however, was quite clear. The meninges were normal in appearance. The cord showed no lesions on section. The ganglia showed no macroscopic lesions, and no hemorrhages were found about the posterior roots or the nerves going from the ganglia.

Portions of the various organs, including the cord and the ganglia, were hardened in Orth's fluid. The ganglia were transferred to 96 per cent. alcohol after a few hours. Portions of various organs, including the skin, were also hardened in Zenker's fluid.

Bacteriological Examination. Cover-slip preparations from the lungs and pleuræ showed lanceolate diplococci in capsules. Cultures on blood serum and on glycerin agar from the lungs, heart's blood, liver, spleen, kidneys, and cerebro-spinal fluid remained sterile.

Histological Examination. Lungs. Sections from both lungs showed well-marked croupous pneumonia, with lanceolate diplococci in the alveolar exudate.

Liver. There was well-marked fatty degeneration of the liver cells, congestion of the capillaries, with marked round-cell infiltration about many of the portal systems. No focal necrosis and no bacteria were found in suitably stained sections.

Kidneys. There were scattered areas of chronic glomerulitis, with thickening of the capillaries and of Bowman's capsule, with but little atrophy of the neighboring tubules. The epithelial cells of the convoluted tubules showed cloudy swelling. With no apparent relation with changes in the glomeruli or tubules, there were numerous areas of round-cell infiltration; most of these cells were of the plasma-cell type, but some were lymphocytes. There was no necrosis of the renal epithelium and no abscess formation. No bacteria were to be found.

Skin. Sections were made through both areas of herpes, and, with the exception that the lesions were more extensive in the older lesion (sixth dorsal region), the changes were the same. There were few unbroken vesicles, but in most places the surface of the lesion was covered with amorphous and fibrillated fibrin containing a larger or smaller number of desquamated, swollen, and often disintegrating and necrotic epithelial cells. Some of these cells had undergone coagulation, and others liquefactive necrosis. In some places the cells of the deeper layer of the epidermis were markedly swollen, vacuolated, and evidently dropsical. In the fibrin and among the epithelial cells on the surface there were variable, often great, numbers of polymorphonuclear neutrophilic leucocytes. In some places there were cavities formed by the elevation of the superficial or subcorneal layer of epithelium. These were of considerable size in places, but were not numerous. Other small vesicles occurred in the exudate, their walls being formed by necrotic cells. Still other vesicles were between the epidermis and the underlying papillary layer. These were always small. In many places the papillary layer was exposed by the total destruction of the epidermis, and was covered by the exudation. In the papillæ and in the upper layer of the corium the veins and capillaries were markedly dilated, and in places there was hemorrhage, either into the tissue or upon the surface.

The papillæ and the upper layers of the corium showed other intense changes, coagulation necrosis, with hyaline and fibrinoid changes, nuclear fragmentation, and infiltration, with large numbers of polymorphonuclear neutrophiles, lymphocytes, and some plasma cells. Here and there a few eosinophiles were to be seen. This cellular infiltration was both diffuse and along the bloodvessels. Many of the sweat glands and hair follicles were swollen and distended with leucocytic and serous exudate. The epithelial cells were commonly swollen,

granular, and often desquamated and necrotic. About many of these glands there was well-marked leucocytic infiltration, a few of the cells being eosinophiles. Scattered collections of leucocytes were also seen in the deeper layers of the skin. No bacteria were to be found in any of the lesions in sections stained by Weigert's fibrin method or with eosin and methylene blue.

The whole appearance of the lesion points to rapidly necrotic and exudative processes.

Posterior Root Ganglia. Sections were cut of the eleventh and twelfth dorsal and first lumbar ganglia of both sides and stained by Nissl's, Weigert's, and Marchi's methods, as well as with methylene blue and eosin, and hæmatoxylin and eosin. Sections from all the ganglia studied, except the eleventh dorsal of the left side, were entirely normal.

In sections of the latter ganglion changes were found in two places: (1) at one side of the ganglion about midway of its length, and (2) at the peripheral end.

1. In the sections cut transversely through about the middle of the ganglion at one side there was considerable hemorrhage, with pigmentation, into the capsule. In some of the sections corresponding to the area of capsular hemorrhage there was just beneath the capsule marked congestion of the capillaries and interstitial hemorrhage between the ganglion cells. In several sections small areas of cellular infiltration about destroyed ganglion cells were found. The ganglion cells elsewhere stained well and appeared normal.

2. At the peripheral end of the ganglion there were a number of amylaceous and hyaloid bodies, both singly and in groups, of the size and shape of ganglion cells, and lying in spaces similar to ganglion cell spaces. Many of these bodies were finely granular, some of the granules staining pink with eosin, and others blue with toluidin blue. Many bodies stained diffusely pink with eosin, and some diffusely blue with blue dyes. In some a central nucleus was apparent, and many showed a concentric arrangement. In a few places hyaline masses were made out in lymph spaces and in blood capillaries. Hyaloid and amylaceous bodies were also found in unmistakable lymph and blood-vessels. The question whether or not some at least of these bodies represented degenerated nerve cells is difficult to answer. From careful study I am convinced that some of them were formed and lie in nerve cell spaces. No lesions of the peripheral nerve, the posterior nerve roots, or in the spinal cord, could be made out.

The interpretation of the pathological changes of the above case appear to be as follows:

Acute croupous pneumonia following bronchitis, with the ordinary parenchymatous changes of the liver and kidneys common in such cases, with the addition of acute interstitial hepatitis and nephritis; an herpetic eruption of certain cutaneous areas, the spinal root ganglion corresponding to one of which areas was shown to be the seat of definite lesions (congestion and hemorrhage of both the capsule and a small area of the interstitial tissue of the ganglion, with cellular infiltration about a few degenerated ganglion cells, with hyaloid and amylaceous bodies, in another portion of the ganglion).

It seems fair, in the light of our present knowledge, to attribute these various lesions to the toxins of the pneumococcus.

The failure to find degenerative changes in the cord, the posterior roots, and the peripheral nerve is in accord with observations of Head and Carpenter, who did not find changes in these organs in a case of herpes dying on the eighth day. They were present in a case dying on the thirteenth day.

Including the 5 cases of Lesser, Chandelux, and Dubler with the 16 cases of Head and Carpenter, there are 21 well-studied cases of herpes zoster of the trunk in which definite destructive lesions have been demonstrated in the posterior root ganglia, corresponding to the distribution of the herpetic eruption. Two of the 21 cases of Head and Carpenter involved the head, in 1 case the ganglion was not removed, and in 2 others, in which death took place in 139 and 240 days, respectively, no lesions of the nervous system were found. In all 9 of the acute cases (three to sixteen days after the appearance of the eruption), definite and unmistakable ganglionic lesions were found. Of these cases 2 had had acute infections (cystitis, with retention of urine in paraplegia, and acute bronchitis and tubercular pneumonia). In the 12 chronic cases in which death occurred in from 57 to 790 days after the herpes the sensory ganglia corresponding to the distribution of the eruption showed well-marked chronic changes.

Our next case shows that the changes in the skin and Gasserian ganglion in herpes of the lips and nose in pneumonia are identical with those occurring in herpes ophthalmicus, and in the skin and posterior root ganglia in both primary and secondary herpes zoster of the trunk. It is also, curiously enough, apparently the first case of herpes of this region in which changes have been sought for in the Gasserian ganglion.

CASE II. *Summary.* Acute croupous pneumonia in a bartender, aged forty-one years. Death on the sixth day of the disease. Two days before death well-marked herpes of the upper lip and the nose, being much more extensive on the left side.

Autopsy showed acute croupous pneumonia (gray hepatization) involving the whole of the right lung, with fibrinopurulent pleurisy of the left side, œdema and congestion of the left lung. Chronic fibrous obliterative pleurisy of the right side. Herpes of the upper lip and nose, most marked on the left side. Congestion of the veins about the origins of the superior maxillary branches of both Gasserian ganglia. Hemorrhage into the capsule and tissue, with interstitial cellular infiltration and compression and degeneration of the ganglion cells near the origin of the superior maxillary branch of the left Gasserian ganglion. A few small areas of cellular infiltration in the same part of the right Gasserian ganglion. Marked congestion of the veins of the neck and brain and of the cerebral sinuses. Pneumococcus in the right lung and left pleura.

Clinical History. For permission to use the clinical history of the following case I am indebted to the courtesy of my colleague, Dr. J. H. Lowman, in whose service in the Lakeside Hospital the patient was admitted February 6, 1902, complaining of pain in the right side of the chest, cough, and fever.

The patient was a male, aged forty-one years, white, and a barkeeper by occupation. His family history was without present interest.

Personal History. He did not recall having ever been sick before, and denied having had diphtheria, scarlatina, rheumatism, pneumonia, pleurisy, syphilis, gonorrhœa, typhoid and malarial fevers. Some time ago he injured his right temple by a fall, but the wound healed promptly and was followed by no clinical symptoms. He drank beer and whiskey to excess at times, and also used tobacco. He had been a barkeeper for twelve years.

Present Illness. He got his feet wet on the night of February 8th, and awoke the next morning with severe pain in the right side of the chest, but did not have a chill.

On admission he had the physical signs of consolidation of the lower portion of the right lung. The left lung was clear. The spleen was enlarged. Examination of the other organs was negative. The leucocyte count on February 8th was 19,000, and on February 9th 13,000 per cubic millimetre. On February 9th, the fourth day of the disease, there appeared a well-marked vesicular eruption over the upper lip and the outer surface, and in the vestibule of the left side of the nose. This eruption on the lip and the outside of the nose extended somewhat to the right side of the median line. The sputum contained lanceolate diplococci. By February 11th the whole right lung was consolidated, and numerous moist râles were to be heard over the left lung.

The patient was delirious. Death occurred suddenly at 1.15 P.M., February 11, 1902, on the fifth day of the pneumonia and the beginning of the third day of the herpetic eruption.

Autopsy One Hour after Death. Body warm, no rigor mortis. Body 165 centimetres long, well built, and well nourished. There were no marks, scars, or wounds on the body. On the upper lip, involving both mucous and skin surfaces, there were a number of dried crusts surmounting slightly elevated areas, with red margins. These areas varied from 2 to 5 millimetres in diameter. Similar papules and dried vesicles were present on the skin of the vestibule and external surface of the left side of the nose. Altogether there were from fifteen to twenty such areas. Several similar lesions were also found to the right side of the median line of the lip and nose. No other herpetic eruptions were to be found on the body.

Nervous System. The veins of the dura and pia arachnoid and all the sinuses were markedly congested; the pia arachnoid was smooth and glistening. The structures at the base of the brain were normal. The brain on section showed congestion, but was otherwise normal in appearance.

The Gasserian Ganglia. The veins near the ganglion were engorged with blood. The ganglion was of ordinary size. On the upper surface just below the entrance of the sensory root and between and about the exit of the ophthalmic and superior maxillary branches the veins were congested and stood out prominently. The same appearance was seen on the posterior surface, but the congestion was less well marked.

The Left Ganglion. The vessels about the ganglion were engorged, as were the veins about and between the origin of the ophthalmic and superior maxillary branches of the ganglion. About the root of the superior maxillary branch this was very marked, and there was also hemorrhage into the capsule at this part on the posterior aspect of the ganglion. The fifth nerve and the branches from both ganglia appeared normal. The cord and the posterior root ganglia were not removed.

Chest. The chest was well formed; the sternum, ribs, and costal cartilages were normal.

The right lung was bound down by old but thin adhesions; the pleural cavity was obliterated. The right lung was consolidated throughout. On section it was firm and airless, of a grayish color, and quite granular in appearance. The mucosa of the bronchi was congested, otherwise normal. The left pleural cavity contained about 100 c.c. of seropurulent fluid. The surface of the lower lobe was covered with a thin fibrinous exudate. The lung crepitated throughout. On section the lung was markedly congested and œdematous, but was free from consolidation.

The description of the other organs is without present interest, and will, therefore, be omitted.

Cover-slips from the right lung and left pleura showed encapsulated lanceolate diplococci.

Plate cultures from both lungs, the left pleura, and heart's blood and pericardium showed pneumococcus in pure culture. Similar cultures from the liver, spleen, kidneys, and gall-bladder remained sterile.

Histological Examination. Lungs. Sections of the consolidated area showed well-marked croupous pneumonia, with lanceolate diplococci in the exudate. Sections of the other organs, with the exception of the skin of the lip and nose and of the Gasserian ganglia, showed nothing of present interest.

Skin of Lip and Nose. Bits of tissue were cut out and hardened in formalin and 95 per cent. alcohol, and sections were stained in carbol-toluidin blue and eosin, hæmatoxylin and eosin, and by Weigert's fibrin method.

The changes found were practically identical with those from the herpetic areas of Case I.

As in Case I., few well-developed vesicles remained, the surface of the lesions, as a rule, being covered with a crust of amorphous and fibrillated fibrin and fibrinoid material containing desquamated and often necrotic epithelial cells, polymorphonuclear and mononuclear leucocytes, and cellular and nuclear fragments. Here and there rather small vesicles could be made out. As in Case I., some were elongated cavities in the exudate, or in the superficial layer of the skin, just beneath the horny layer, while others were between the underlying inflamed papillæ and the epidermis. Most of the latter cavities were small, and their walls were formed of necrotic epithelium and their floors of the naked papillæ. In some places ballooning of the cells of the epidermis could be made out. In many places the margin between the necrotic and the unchanged epidermis was rather clear cut, but in some places near the necrotic portions the small vesicles could be made out in the neighboring otherwise normal epidermis. In most places at the site of the lesion the whole thickness of the epidermis was necrotic.

Beneath the fibrinous layer there were, in all sections examined, changes in the epithelium, marked coagulation and liquefactive necrosis, and hyaline transformation of the cells. The papillary layer and outer part of the corium were similarly affected. There was, in many places, marked nuclear fragmentation. The epithelium of the sweat glands and some of the hair follicles, when present, showed changes—swelling and liquefaction, and often a reticular appearance. Some cells were markedly swollen, many cells showed coagulation necrosis. Many nuclear fragments were to be seen. The bloodvessels, especially the capillaries and small veins of the papillæ and corium, were markedly dilated. Some were crowded with leucocytes. In some of the superficial vessels there were thrombi composed of pink-staining material. The papillæ and the superficial portions of the corium were diffusely infiltrated with great numbers of polymorphonuclear, neutrophilic, and large and small mononuclear leucocytes, and some plasma cells. The leucocytic infiltration could also be traced along some of the small vessels into the deeper layers of the corium. About some of the superficial veins and capillaries often large numbers of red blood cells had escaped into the tissue. Some of the lymph spaces were dilated. The lesions here, as in the herpes of Case I., were both degenerative and exudative, and involved both epidermis and corium. No inflammatory changes were found in nerves in the skin. No bacteria were found in the lesions of the skin, but in the superficial part of the fibrinous exudate, in sections taken from the vestibule of the nose, diplococci and some bacilli, morphologically like B. mucosus capsulatus, were found.

Gasserian Ganglia. The ganglia with the fifth nerve roots and the origins of the ganglionic branches were hardened in formalin (10 per cent. solution).

The two ganglia were mounted in celloidin, side by side, on the same block and cut in serial sections, every other section being stained and mounted in order. Many of the alternate sections were also stained.

In mounting on the block the left ganglion was at a somewhat higher level than the right, so in the parallel sections as mounted for histological study the two ganglia were not identical in structure, but as the series was followed to the end the right ganglion was found to be similar to the left in structural detail.

Left Gasserian Ganglion. In sections 1 to 8 there were no ganglion cells near the superior maxillary branch. The veins about this branch were enormously dilated and filled with red blood cells. In some places in the largest vein there were collections of leucocytes and larger and smaller granular masses, suggesting fibrin. No changes were found in the opposite end of the ganglion. About the dilated veins there was hemorrhage into the pia or capsule of the ganglion. In section 9 a small oval bit of ganglion tissue, containing ganglion cells, became apparent near the superior maxillary branch. In sections 9, 10, 11, and 12, corresponding to this, there were capsular and subcapsular hemorrhage, with compression of the superficial ganglion cells. In sections 15 to 35 the small strip of ganglion tissue in relation with the superior maxillary branch became very much larger, and formed an elongated strip of tissue traversing the thin portion of the ganglion, reaching from the side of the superior maxillary branch to, but not

uniting with, the larger ganglionic mass corresponding to the origin of the inferior or third branch. About the middle of this strip there was marked congestion of the veins about the superior maxillary branch, into and, here and there, just beneath the capsule of the ganglion. This congestion and hemorrhage must have compressed the ganglion cells in this region. Sections 36 and 37 showed the first well-marked changes in ganglion cells and interstitial tissue. About the central portion of this strip of ganglion tissue some of the ganglion cells were vacuolated, others were very pale, non-granular, homogeneous, and stained poorly. The nuclei showed no special changes. Some ganglion cells were evidently necrotic, the cytoplasm staining diffusely, and the nuclei being displaced to one side. Here, especially about the changed ganglion cells, there was marked cellular infiltration, with plasma cells, lymphocytes, and polymorphonuclear neutrophiles.

These cells were both in the interstitial tissue and grouped about changed ganglion cells, which were evidently compressed thereby. In places there had evidently been a proliferation of the endothelial cells about the ganglion cells.

In sections 40 to 60 the congestion and hemorrhage were noticeable, the cellular infiltration being inconspicuous.

Beginning in section 73, cellular infiltration became marked again. In section 77, in the above-mentioned strip of ganglion tissue involving an area of from twenty to twenty-five ganglion cells, there was marked cellular infiltration with interstitial hemorrhage. Some of the ganglion cells were necrotic. Smaller areas of interstitial cellular infiltration were found near this area.

Section 78, showed, at the border of the same hemorrhagic area a group of degenerated ganglion cells surrounded by large numbers of lymphocytes, plasma cells, and polymorphonuclear leucocytes, red blood cells, and proliferated endothelial cells of the pericellular spaces. The ganglion cells of the affected area showed the same changes described above; many have entirely disappeared. They seemed to have been compressed and destroyed by the interstitial exudate and hemorrhage. A few ganglion cells in this area were the seat of large vacuoles. Nuclear figures could be made out here and there in the cells of the interstitial infiltration. In most of the sections from 60 to 85 these changes were more or less well marked. The area of hemorrhage could be traced in them all. The changes in the left ganglion were lost after the 95th section.

Right Gasserian Ganglion. All the sections cut showed congestion of the veins and capillaries about the second or superior maxillary branch, as described for the right ganglion. Hemorrhage was, however, absent. In sections 80 to 95 a few areas of cellular infiltration were found in the area corresponding to that showing similar changes in the left ganglion.

These areas of cellular infiltration were small and scattered, and nothing like so well marked as those found in the left ganglion. In both ganglia a considerable number of amylaceous and hyaloid bodies were found in the lymph spaces.

In preparations of the fifth nerve, and of the superior maxillary branches of both sides, made by Marchi's method, no degenerations were to be found.

No bacteria were found in the ganglia or in the dilated veins.

That herpes zoster, following some part of the distribution of the trigeminal nerve is due to changes in the Gasserian ganglion is supported by observations on four previous cases.

Wys, in 1871 (quoted by Head and Carpenter), reported a case of herpes zoster involving the distribution of the whole of the first division of the trigeminal nerve ; the patient died on the seventh day of the eruption. There were thrombosis of the ophthalmic vein, abscesses of the eye muscles, and purulent infiltration of the connective tissue of the eyeball. There was hemorrhage about the origin of the ophthalmic division and about the inner side of the ganglion. Microscopically, there was extravasation of blood into the ganglion and into the first division of the nerve, with purulent inflammation of the ganglion.

Sattler, in 1875 (quoted by Head and Carpenter), reported a case of herpes ophthalmicus of the right side, in a man, aged eighty-five years, occurring some days after carbonic oxide gas poisoning. Death occurred fourteen days afterward. In the corresponding Gasserian ganglion there was destruction of ganglion cells and small-cell infiltration. The ophthalmic branch of the nerve showed degeneration, the other branches being normal.

Head and Carpenter reported a case of herpes of the right frontal region in which, one hundred and ninety days later, at autopsy, they found hemorrhage and destruction of ganglion cells in the right Gasserian ganglion.

In another case these authors studied the right Gasserian ganglion thirty days after an attack of herpes of the chin and cheek of the right side of the face (third division). "In that portion of the right ganglion which receives the fibres of the inferior maxillary branch of the nerve" there was congestion of the bloodvessels, destruction of ganglion cells, and cellular infiltration. Degenerated fibres were found in the fifth nerve central to the ganglion, in the pons and medulla, as well as in the inferior maxillary division of the fifth nerve.

Both of the last two cases were subjects of general paralysis. Wys' case was apparently spontaneous, while that of Sattler followed carbonic oxide gas poisoning. As far as I am able to find, these comprise all the observations on the relation between changes in the Gasserian ganglia and herpes distributed along the course of the trigeminus. Of these four cases, three were examples of ophthalmic herpes, and one of inferior maxillary herpes. I am not aware that the relation of the changes in the Gasserian ganglia to herpes of the upper lip and nose, occurring either spontaneously or in the course of pneumonia, malaria, cerebro-spinal meningitis, gastro-intestinal disorders, and other infections and intoxications, has been investigated.

I wish to call attention to the practical identity of both the lesions of the skin and of the nervous system in these two cases of herpes, the

one of the trunk, and the other of the upper lip and nose, both occurring during the course of acute croupous pneumonia. Reference to the detailed descriptions will, I think, show that the lesions agree in all important particulars, and only differ in severity. The extent and severity of the skin lesions are also in definite relation to those of the corresponding ganglia. The skin and ganglion changes in Case II. (trigeminal distribution) were more severe than in Case I. (dorsal 11). One is forced to the conclusion that the herpes of the trunk and the herpes of the lip and nose occurring in these two cases are identical clinically, histologically, and probably etiologically. They further demonstrate that the ganglionic lesions of herpes zoster of the trunk and herpes of the lip and nose occurring in pneumonia are identical with those described by previous observers for herpes zoster of the trunk and extremities and herpes distributed along both the first and third divisions of the trigeminus, occurring both spontaneously (idiopathic herpes), and secondarily to acute infections, as cystitis, bronchitis, acute tubercular pneumonia (Head and Carpenter), after poisons, as carbonic oxide gas (Sattler), and the invasion of tumors (Head and Carpenter). As far as I have been able to learn, no anatomical studies have been made on the lesions of the nervous system in herpes of the lip and nose occurring in malaria and other continued fevers, in pneumonia, cerebro-spinal meningitis, coryza, or gastro-intestinal disorders. We are also without similar observations in genital herpes. In the case of the latter, however, Unna's description of the skin lesions, based on observations in three cases, is practically identical with his findings in a case of herpes labialis in an individual dead of a continued fever, with these lesions of our cases and with those found by Head and Carpenter and others in herpes zoster. Unna, however, found marked ballooning of the epithelial cells of herpes zoster (trunk?), a condition not found by him in herpes genitalis and his one case of herpes labialis.

In our case of labial and nasal herpes, in some places the swelling and liquefaction of the epithelial cells, especially in the hair follicles, was better marked than in the case of herpes of the trunk. It seems likely that in a necrotic and exudative process passing rapidly through different stages the changes would not be uniform in the lesions of each and every case. All that can be said at present is that the skin lesions of our two cases are identical and agree with those described by most authors.

Though there are no previous observations on the relation of changes in the nervous system in herpes labialis and nasalis occurring in pneumonia, and none at all in malaria, for the third acute infectious process in which herpes is common there are some most interesting and suggestive data. I refer to epidemic cerebro-spinal meningitis. In their

monograph on this disease, Councilman, Mallory, and Wright[1] call attention to the frequent occurrence of herpes of both the lips and nose, and to the fact that it may appear on other parts of the face and even elsewhere on the body; and in the summary on page 163 they state that "in its (the infection) extension along the fifth nerve it produces an acute inflammation of the Gasserian ganglion, with destruction and degeneration of the nerve cells composing it." On page 114 they state that sections were made of the Gasserian ganglia in five cases and of the spinal ganglia in two. The Gasserian ganglia in acute cases were "infiltrated with pus, and masses of ganglion cells were often separated from their connection." There was more or less hemorrhage; some ganglion cells were small and some devoid of nuclei; some cells contained large vacuolar spaces. Diplococci were found in some sections. In the more chronic cases the amount of leucocytic infiltration was less, but there was marked proliferation of the interstitial tissue, and in one case there was œdema, with marked cellular infiltration, especially about the ganglion cells, lymphoid, epithelioid, and plasma cells being found. There was atrophy, often going on to complete necrosis of the cells (ganglion cells). The spinal ganglia were not equally affected, but all seemed somewhat swollen and œdematous. On microscopic examination much the same changes were found in these as in the Gasserian ganglia. Degenerative changes were, of course, to be found in the nerves. They also showed that these changes may occur rapidly, for purulent infiltration was observed in the ganglia of a goat twelve hours after inoculation of the diplococcus intracellularis meningitidis into the spinal cord.

On page 125 they state that in one case the herpetic vesicles on the lip were examined. In them there was extensive infiltration, with pus cells in the tissue around the vessels, and proliferation of the fixed cells of the tissue. No mention is made of the epithelium; no diplococci were found in the pus cells.

Unfortunately no statement is made concerning the presence or absence of herpes of either the head or the trunk in the cases showing lesions of the Gasserian and spinal ganglia. In the one case showing skin lesions (small, dark purplish spots on the trunk and extremities) coming to autopsy they found congestion and dilatation of the blood-vessels of the skin, with hemorrhage in places, and in some places proliferation of the cells about the vessels. In the centre of the hemorrhagic area there was some infiltration with pus cells, and in one place the upper layers of the epithelium were slightly elevated by the accumulation of pus cells beneath.

These observations furnish at least ample explanation for the occur-

[1] Report of the State Board of Health of Massachusetts, 1898.

rence of herpes of both the head and trunk in meningitis. The influence of the changes in the ganglia upon the other changes in the skin are, of course, only conjectural.

ETIOLOGY OF HERPES. From what has gone before, it is evident that the lesions of the skin and nervous system of primary, or idiopathic, or spontaneous herpes zoster of the head, neck, trunk, and extremities are the same, as are also the same lesions in certain cases of herpes of the trunk and face (upper lip and nose) occurring in pneumonia (Howard), and similar lesions of the nervous system in herpes of the trunk occurring in acute cystitis in a man with paraplegia, acute bronchitis; pernicious anæmia in a patient who had taken arsenic, and after the invasion of a lymphosarcoma (Head and Carpenter), and finally in ophthalmic herpes after poisoning with carbonic oxide gas (Sattler).

Primary herpes zoster is regarded by Head and Carpenter, and by Van Harlingen[1] and others, as an acute specific infectious disease due to an unknown cause, having a selective affinity for certain sensory ganglia in which certain degenerative, destructive and often inflammatory lesions are produced. These lesions in some unknown way cause acute degenerative, exudative, and proliferative changes in the skin and mucous, and possibly serous, membranes corresponding to the nerve distribution of the affected ganglia. There is a considerable amount of evidence in favor of the hypothesis that there is an acute specific infectious process of this nature, but no convincing proof has been so far adduced in its support.

It must be further borne in mind that there is a large group of cases of herpes either following the action of known toxins (carbonic oxide gas and arsenic), the involvement of the ganglia by tumors, or occurring in the course of certain infections, as pneumonia, malarial and typhoid fevers, and cerebro-spinal meningitis (in which, as has been shown, there are often intense lesions of the sensory ganglia), in all of which the lesions, as far as is known, are identical. Herpes, like pneumonia, meningitis, and inflammation in general, is a pathological condition, with definite lesions, capable, however, of being excited by a variety of causes, and is not always produced by the same causes; an efficient cause being one producing compression, degeneration, or destruction of ganglion tissue. It is not improbable that the primary lesions are often due directly or indirectly to the soluble toxins of various micro-organisms. The special frequency of labial and nasal herpes, and of herpes of the head and face in general, in malaria, pneumonia, and cerebro-spinal meningitis, is readily explained. In the case of malaria the organisms in the circulating blood often accumulate in the brain, where the Gasserian ganglia may be readily affected by con-

[1] THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, January, 1902.

gestion, the action of toxines, or even by capillary thrombi of parasites. In pneumonia, the organisms or their toxines may locate in the ganglia. What, however, to my mind seems the most reasonable predisposing cause of the frequent occurrence of labial and nasal herpes in this disease is the marked passive congestion which is so often present. This was especially noticeable in Case II., in which there was marked congestion of not only the bloodvessels and sinuses of the brain and meninges, but of the vessels of and near the Gasserian ganglia themselves, and especially about the second division. This marked congestion, which favors hemorrhage, the action of the toxines, poisons, and organisms in the blood, and thrombosis, may probably of itself, by pressure and by interfering with nutrition of the ganglion cells, cause degeneration sufficient to excite the herpetic changes.

As Councilman, Mallory, and Wright have shown, in epidemic cerebro-spinal meningitis, the spinal sensory ganglia, and especially the Gasserian ganglia, are often the seat of extensive changes due to the extension of the infection along nerve sheaths to these ganglia.

There is, *a priori*, no reason why changes in these ganglia should not occur in bronchitis and pleurisy. There is also no reason why the peripheral lesion in herpes zoster should not affect the pleura, as suggested by Curtin, just as the same process is known to affect the mouth, cheek, and pharynx. We know nothing in regard to the relation of lesions of the nervous system to the so-called simple herpes (with which labial and nasal herpes of pneumonia, malaria, and epidemic cerebro-spinal meningitis have hitherto been included) of the face, especially of the lips and nose, occurring in coryza, gastro-intestinal disorders, and the herpes genitalis.

It is to be hoped that observations will be made on this point, and it is not impossible that some cases, at least, will fall in the class we have been considering.

The question why should the peripheral changes occur after the lesions of the nervous system found in herpes is a difficult one to answer. There is no evidence that the skin lesions are due to the local presence of parasites, infection with which is predisposed by the nerve lesions.

Head and Carpenter are "inclined to think that the trophic disturbances of the skin are an extreme form of activity of the same cells, disturbance of which by afferent impulses along the white ramus produces the hyperalgesia that accompanies visceral referred pain;" but they "do not imagine that the eruption of herpes zoster is produced by disturbance of special trophic nerves, but by intense irritation of cells in the ganglion which normally subserves the function of pain, and more particularly that form of pain produced by afferent visceral impulses."

This is, however, far from explaining why irritation of these ganglion cells and nerve fibres causes a severe inflammatory process marked by intense vascular changes, cell destruction, exudation, and proliferation. The presence of hyaline, granular, and apparently red blood cell thrombi in many of the dilated bloodvessels of the herpetic areas in my cases is of interest, and may account for the hemorrhage, but were hardly extensive enough to explain the necrosis. What was the origin of these thrombi? Were they associated with changes in the vascular endothelium due to nerve changes? Were the hemorrhage and exudation due, in part, to the increased permeability of the vessel walls, the result of loss of nerve control or nerve irritability? These are some of the questions awaiting solution.

Conclusions. 1. Herpes zoster is a pathological condition, like pneumonia, for instance, with definite lesions of certain sensory ganglia, sensory nerves, and the skin, capable of being excited by a variety of causes. It is probable that the primary ganglionic lesions are commonly due directly or indirectly to the soluble toxines of various micro-organisms. The skin lesions may be on the head, neck, trunk, or extremities, corresponding to the Gasserian and posterior root ganglia affected.

2. Various forms can be distinguished. *a.* Spontaneous or primary herpes, thought by Head and Carpenter, and others, to be a specific infectious disease, the specific causal agent of which has a special affinity for certain sensory ganglia (posterior spinal and Gasserian). *b.* Herpes occurring after certain definite toxic agents, as arsenic and carbonic oxide gas, etc. *c.* Herpes occurring in the course of certain acute infectious diseases, as pneumonia, cerebro-spinal meningitis, and probably of malarial and typhoid fevers. The lesions of the ganglia and of the skin in the above three forms are the same, and the processes, therefore, presumably identical. *d.* Herpes simplex, so-called, affecting the lips and nose in coryza, gastro-intestinal intoxications, etc., and genitals (herpes genitalis) has not been sufficiently investigated to be classified; no evidence exists for or against its connection with changes in the nervous system.

3. As far as changes in the skin in herpes are concerned, they are illustrations of particular forms of necrosis and inflammatory reaction, and, as in similar lesions in other organs, can probably be excited in a variety of ways.

4. Herpes should be classified according to its relation to changes in the nervous system, and to this end every possible opportunity should be embraced for extending our knowledge in this direction.

AN EXPERIMENTAL STUDY OF LITHIUM.*

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Lithia was discovered by Arfwedson, in 1817, in the mineral petalite. Since that time lithium has been shown to be widely distributed in nature, but occurring only in small quantities. It occurs in various minerals, in mineral waters, in sea water, in the ash of plants, and in some vegetables used as foods. It has also been found in the ashes of blood and milk. It always occurs in combination as an oxide, chloride, silicate, or fluoride, with potassium and aluminum. Lithium belongs to the group of alkalies and has an atomic weight of only 7 +.

Lithium seems to have been first introduced into medicine by Sir Alfred Garrod[1] about the year 1863, for the cure of gout and rheumatic gout. The reason for its introduction was that lithium was found to be an excellent solvent for uric acid and the urates in experiments, and it was supposed that by giving the substance the deposits in and around the joints could be disposed of and further deposits prevented. Lipowitz,[2] in 1841, was one of the first to show the marked affinity of lithium salts for uric acid, showing that it formed an acid salt soluble in sixty parts of water at 122° F. In 1843 Dr. Alex. Ure[3] found that a urinary calculus composed of alternate layers of uric acid and oxalate of lime when placed in a solution of 4 grains of lithium carbonate in one ounce of water and maintained at blood heat for five consecutive hours lost 5 grains in weight. Thinking that if one could thus lessen the size of urinary calculi in a few hours it would be an easy matter to entirely remove them from the bladder, he advised the injection of solutions of lithium into the bladder for the cure of stone. In practice this was found to be unsuccessful, and it is interesting to note that the trial *case* in which Dr. Ure used the injections afterward came to operation and died.[4] Dr. Ure then showed that one must be very careful in the injection of lithium solutions into the bladder, for if any sodium phosphate be present the insoluble lithium phosphate is formed.

To show the effects that lithium carbonate had on the sodium urate in gouty deposits, Garrod made the following experiments:

A metacarpal bone having the phalangeal extremity completely infiltrated with gouty deposits was placed in water to which a few grains of lithium carbonate were added, and in the course of two or three days no deposit could be seen, and the cartilage seemed to have been restored to its normal state. Similar experiments made with sodium and

* Read before the Ann Arbor Medical Club, May 14, 1902.

potassium carbonates did not show any marked solution of the urates. It was reasoning from such experiments as these that lithium was introduced into medicine as a cure for gout. Of course, the fallacy of the treatment lies in the fact that lithium is a solvent for uric acid and urates only when in concentrated solution as well as in considering the diminished excretion of uric acid and urates as the chief pathological condition in gout.

To show that lithium in dilute solution was not a solvent for uric acid, Krumhoff[5] made the following experiments. To show the solubility of uric acid in distilled water at body temperature, he weighed out 0.5 g. of the pure acid and placed it in a flask containing 200 c.c. of distilled water. Four other flasks were similarly prepared. These were now placed on a water-bath so fixed that the flasks were completely covered in, and only a space was allowed for the thermometer to descend. The water-bath was at 39.5° C., and the flasks at 37.5° to 38.5° C. The heating was kept up for six hours. The flasks were then taken out, allowed to cool, the undissolved uric acid filtered off and thoroughly washed, dried, and weighed, when it was found that the 200 c.c. of water at body temperature had dissolved 0.0217 grain of uric acid. These experiments were confirmatory to similar ones done by Jahns,[6] who found 200 c.c. to dissolve 0.0214 grain in eight hours.

To show the solvent action of lithium chloride the following experiment was done: To 200 c.c. of water containing 0.5 grain of lithium chloride 0.5 grain of uric acid was added and placed on the water-bath under conditions similar to those in the last experiment, and heated for six hours. The undissolved uric acid was then filtered off, washed, dried, and weighed. Four other similar experiments were made, and the average of these showed that only 0.0118 grain of uric acid had been dissolved as against 0.0217 grain dissolved by distilled water under similar conditions. That lithium salts are solvents for urates and uric acid only when in concentrated solutions is not generally taken into consideration, and the majority of those who now administer lithium salts do so with the idea that they are uric acid solvents. The statements made as to the amounts of urates and uric acid eliminated after the use of the lithium salts vary greatly. Levy,[7] giving lithium bromide in gouty subjects, found the urates and uric acid diminished. Haig[8] and Oliver[9] found the uric acid diminished. Considering, however, that no constant diet was used, and also the faulty methods of estimation, these results can be considered of much value.

Dr. Garrod also claimed to have seen marked benefit derived from the external use of solutions of lithium salts applied to joints, even to the disappearance of small tophi. Hüfner,[10] to show that lithium salts were not absorbed through the skin, made a 1 per cent. solution of lithium chloride. This was warmed to 30° C., and one of his pupils

placed both feet in this for thirty or thirty-five minutes, and, although Hüfner was able, by the use of the spectroscope, to detect the presence of lithium in solution in the proportion of nine-millionths part of a milligramme lithium carbonate per c.c., he could not demonstrate lithium in the urine in this and similar experiments, even after the urine for twenty-four hours was taken and evaporated.

Hüfner could not find lithium in the urine after taking 25 milligrammes, even when the urine for twenty-four hours was concentrated to 30 c.c., but after taking 35 milligrammes, lithium could be plainly demonstrated in the urine two hours afterward.

The lithium salts are rapidly absorbed from the stomach. Dr. Bence Jones[11] gave an animal 3 grains of lithium chloride on an empty stomach and detected lithium in the aqueous humor of the eye and in the cartilage of the hip-joint fifteen minutes afterward. He gave 7 grains to a parturient woman eight hours before delivery, and found lithium in the umbilical cord. He also records giving 20 grains to a patient three and a half hours before an operation for cataract, and at operation traces of lithium could be detected in the lens. Four days later it could be detected in the secretions, and was not wholly eliminated till the seventh day. I have detected lithium in the saliva within eight minutes and in the urine and feces within ten minutes after injecting 1 grain subcutaneously in a cat.

The effect of lithium salts on animals was studied as early as 1868 by Rabuteau.[12] As a result of his experiments he concluded that lithium was a harmless metal, being less poisonous than potassium. He noted, however, that 20 grains of lithium sulphate given to a dog caused vomiting and evacuation of the bowels. He only observed the dog for a few hours and does not state the final results. In 1873 James Blake[13] experimented with lithium, and concluded that lithium, sodium, rubidium, tellurium, and cæsium are equal in their action, and that the amount of lithium sulphate necessary to kill rabbits was 1 grain per kilo.

In 1875 Hesse[14] experimented with lithium on frogs, rabbits, and doves. He found that lithium chloride injected into a vein caused diastolic stopping of the heart, while the nerves and muscles were yet excitable. He also found that in warm-blooded animals lithium salts decreased the excitability of the nerve centres, decreased the temperature, and sometimes caused diuresis. Cash and Brunton,[15] experimenting with the metals on frogs, found that lithium, rubidium, and cæsium have a tendency to affect either the upper part of the spinal cord or the higher motor centres connected with the forelimbs, the reflexes disappearing sooner from the arms than from the legs, and that stiffness was noticed in the arms. They also found the motor nerves paralyzed to a greater or less extent by lithium and potassium.

In 1884 Krumhoff[5] made a careful experimental investigation of the effects of lithium on animals, and reviewed the literature thoroughly. He found that when a lithium salt was injected into the blood it depressed the heart's action and caused a fall of blood pressure, and if the dose was large enough stopped the heart in diastole. The dose of lithium salts necessary to stop the heart he found to be much larger than the dose of potassium salts necessary to produce the same effect. He also found that vomiting and diarrhœa were caused by its subcutaneous use, and the prolonged ingestion of small doses killed the animal sooner or later by causing a fatal gastro-enteritis.

The lesions found at autopsy were hemorrhages into the stomach and bowels, reddening and swelling of the mucous membranes, and sometimes small hemorrhages into the heart muscle. The prolonged use of small doses of potassium salts caused no such effects.

To carefully study the effects of lithium salts on animals and determine where it was excreted, I made thirty odd experiments on cats and dogs, administering the drug subcutaneously and by the mouth. The salt used in my experiments was the chloride, because of its easy solubility and because the carbonate, which is usually used therapeutically, is in part, at least, changed to the chloride in the stomach. A pure salt was used and was examined quantitatively for lithium, as well as titrated for chlorides, so that the dosage might be accurate.

The method of quantitative estimation which I used was as follows: The urine, saliva, or feces to be examined was evaporated to dryness and burned. This was then extracted, with a large amount of water, rendered acid by hydrochloric acid, filtered, and the filtrate evaporated to about 50 c.c. To this milk of lime was added and thoroughly rubbed up until alkaline in reaction. This was then filtered and thoroughly washed with water until the washings failed to show lithium by the spectroscope. To this solution ammonium carbonate in solution was added as long as a precipitate formed, filtered, and the filtrate washed with water till the spectroscope failed to show any lithium in the washings. This filtrate was now acidulated with hydrochloric acid and evaporated in a platinum dish to dryness, and heated to drive off the ammonia. The residue was dissolved in water acidulated with hydrochloric acid and evaporated to dryness. This residue consisted of potassium, sodium, and lithium chlorides, and as the chloride of lithium is soluble in alcohol, while the chlorides of sodium and potassium are nearly insoluble, the dry salt was extracted with equal parts of absolute alcohol and ether. Comparatively small amounts were used, and the undissolved portion, after being washed with equal parts of alcohol and ether, was dissolved in water and examined by the spectroscope. If this showed the presence of lithium the process was repeated. In this way I was able to separate most of the sodium and potassium chlorides

from the lithium chlorides. The alcohol-ether solution was now evaporated to dryness, dissolved in a little water, and a 10 per cent. solution of sodium phosphate added, 1.1 c.c. for each 0.1 g. of lithium excreted. This was now evaporated to dryness, whereby the soluble lithium chloride was changed to the insoluble lithium phosphate. To this a small amount of water was added, heated slightly, and an equal amount of strong ammonia solution added, and let stand for twelve hours in the cold. As the lithium phosphate is practically insoluble in the strong ammonia solution, while the phosphates of sodium and potassium are freely soluble, the undissolved portion was lithium phosphate. This was now filtered through a Goosh filter, washed with a solution of strong ammonia, and this first wash-water again run through for lithium. The Goosh filter was now placed in an oven, thoroughly dried, and the weight of lithium carbonate determined, which was calculated back to the chloride.

By this method the lithium phosphate always shows a strong sodium flame, and the results are probably high. Yet, by becoming accustomed to the method, fairly accurate results can be obtained.

Only a few experiments will be quoted in detail.

Experiment 31, March 21, 1902. Healthy cat, weighing 1650 g., was given 1 g. lithium chloride, well diluted, hypodermically, at 10.40 A.M. At 10.45, movement of bowels, hard-formed. At 10.48, vomited; consisted of mucus and undigested food. An examination of this by the spectroscope showed the presence of lithium. At 11.05, marked salivation. At 11.10, vomited. At 11.30, movement of bowels. At 2.30 P.M. the cat had passed two or three diarrhœal stools. She sat humped up in the cage, and would not stir. By 5 P.M. she had had two more movements of the bowels and had vomited once.

22d. At 9 A.M., cat very weak, unsteady on feet. Drinks, but will not eat. Several diarrhœal stools during the night. He passed some urine, but not a great deal. At 5 P.M., cat in about the same condition, although weaker.

23d. Cat much weaker. Unable to walk without tottering. Hind-parts seem most useless. Will not eat or drink. No stool or vomiting. About normal amount of urine.

24th. Cat died during the night.

Autopsy Findings. March 24th, 11 A.M. Weight, 1405 g. All the organs were normal in appearance, except the stomach and intestines. The mucous membrane of stomach was reddened, and in two places showed hemorrhagic spots the size of a small pea. Mucous membrane of the small bowel not much inflamed, but covered with a thick, tenacious bile-stained mucus. The mucous membrane of the large bowel distinctly reddened and thickened, and contained two small ecchymoses. All the vomited matter, the stools, and the contents of the stomach and bowels were added together, and from them 0.086 g. lithium chloride was obtained. A microscopic examination was made of parts of the heart muscle, liver, kidneys, stomach, and intestines. The heart, liver, and kidneys showed no appreciable changes. Sections of the stomach

and bowel showed a marked congestion. The mucous membrane was covered with a thick coating of mucus, and in places contained small hemorrhages.

Experiment 5, November 11, 1901. A healthy cat, weighing 3700 g., was given 2 g. lithium chloride, well diluted, hypodermically, at 1.35 P.M. At 1.40, watery stool. At 2.00, passed urine. At 2.10, vomited. At 2.20, washed out stomach. At 2.40, thin, watery stool. At 3.10, washed out stomach. At 4.00, washed out stomach. At 5.00 cat was killed with chloroform.

Autopsy. Stomach contained mucus and water, which were added to vomitus and stomach washings. No marked change in the stomach walls. Bowels empty, and showed no marked change. Liver, kidneys, lungs, and heart apparently normal. The vomitus and stomach washings were kept separate from the bowel contents and stools, and the lithium in each estimated. The former contained 0.125 g. lithium chloride and the latter 0.034 g.

Experiment 10, November 25, 1901. A healthy cat, weighing 1320 g., was given 0.5 g. of lithium chloride, well diluted, hypodermically, at 1.20 P.M. At 1.30, vomited several times; 1.40, profuse watery stool. Up to 4.00 had vomited several times and had several watery stools.

26th. 1.00 P.M. Cat seems quite normal. Has not vomited nor had movement of the bowels during the night. Has passed considerable urine. When taken out of the cage seems stiff and perhaps somewhat unsteady on her feet. She drinks, but will not eat.

27th. 1.00 P.M. Cat more feeble than yesterday. When taken from the cage she is so stiff and weak that she can hardly walk. Hindparts seem most useless. No vomiting. No stools. Will not eat or drink.

28th. 1.00 P.M. Cat the same, but weaker.

29th. 1.00 P.M. Cat extremely weak. Unable to walk. Seems to be unable to raise her hindparts. No stools or vomiting.

30th. Cat died during the night.

Autopsy. Cat weighed 1080 g. The lungs, heart, liver, and kidneys were normal. Mucous membrane of the stomach reddened and covered with a thick, bile-stained mucus. Two small ecchymoses into the mucous membrane near the pylorus.

Small bowel somewhat congested and covered with a thick, tenacious mucus. Otherwise normal. Large bowel deeply congested. Several areas of hemorrhage into the mucous membrane, which is greatly thickened. The vomitus was worked separately from the stools, and from the former 0.021 g. lithium chloride, and from the latter 0.026 g. lithium chloride was obtained.

Microscopic examinations of the various organs showed no evident changes in the lungs, heart, liver, and kidneys, while the changes in the stomach and bowel corresponded to those given under Experiment No. 31.

Experiment 9, November 22d. A healthy cat, weighing 2650 g., was given 1 g. lithium chloride, well diluted, hypodermically. This experiment is of interest chiefly in that the cat did not vomit, but was salivated profusely. This salivation was undoubtedly due to nausea, and was observed in many experiments before vomiting came on. All the saliva was carefully collected in a clean dish, and, as it showed lithium by the spectroscope, the amount was estimated quantitatively, and

0.021 g. lithium chloride was obtained from it. The cat died in three days with all the signs of gastro-enteritis, and from the stools, stomach, and bowel contents 0.110 g. of lithium chloride was obtained.

These experiments have been given in detail, because they show the essential symptoms and cause of death from lithium salt in whatever form or manner it be administered. From these experiments it will be seen that shortly after the administration of the lithium salt the animal is taken with nausea, vomiting, and diarrhœa, and dies sooner or later with all the characteristic signs and symptoms of gastro-enteritis, the progressive emaciation and weakness being wholly the result of the gastro-enteritis. The stiffness and inability to use the hindparts is also due to the weakness caused by the gastro-enteritis, and is seen in poisoning from the heavy metals, colchicum, and other drugs that cause a fatal gastro-enteritis. There is practically a total absence of nervous symptoms, although in a few cases slight tremors were noticed. This is of importance, as tremors have been noted in a few cases of poisoning in man.

From these experiments it will be seen that lithium is partially excreted in the saliva and into the stomach and bowels, though the quantity that can be reclaimed from these secretions is usually not great.

To show the effects of the prolonged administration of small doses hypodermically, the following two experiments may be given:

Experiment 12, December 3d. A healthy cat, weighing 3170 g., received each day for eighteen days 0.0567 g. lithium chloride, well diluted, hypodermically. She had diarrhœa on the second day, which was severe by the fourth day, when the stools were blood-streaked. The urine and stools were kept separate. The diarrhœa was severe, and she occasionally vomited. On the tenth day she had lost 500 g., or about one-sixth of her original weight. Her coat had lost its gloss, and her health and strength distinctly lessened. By the eighteenth day she was very weak, weighed 2650 g., had a severe diarrhœa, and, as it was quite evident that she would soon die, she was killed with chloroform, as I wished to examine the tissues in a perfectly fresh condition.

Autopsy Findings. The lungs, kidneys, liver, spleen, and heart were apparently normal.

The stomach did not show any marked changes. The upper part of the small intestines was quite normal, but the lower one-fifth, together with the large bowel, was deeply congested. The mucous membrane was thickened and showed numerous small and large hemorrhagic areas. There were two small superficial ulcers in the large bowel, which was more severely affected than the small bowel, and, I may add, that this is unfortunately the case when small doses are administered, whether given subcutaneously or by the mouth. The stools and urine for the first ten days were examined for lithium. During this time she had been given 0.567 g. lithium chloride. From the bowels 0.039 g., and from the urine 0.228 g. of lithium were obtained.

Experiment 14. In order to accurately collect the urine a healthy female dog, weighing 8.2 kilos., was operated upon, the perineum being

cut so that she could be easily catheterized. After the wound had thoroughly healed, and beginning February 7th, she was given 0.62475 g. of lithium chloride, hypodermically, daily. She was not allowed to pass any urine, being catheterized frequently enough to prevent this. The urine and stools were kept separate. At the end of ten days her weight was 8.1 kilos., and she was lively, ate and drank well, and apparently had not suffered from the injections. From the ten days' urine 0.383 g. lithium chloride was obtained, and from the feces 0.074 g. of lithium chloride. She had received in this time 0.62475 g. of lithium chloride.

The same dose was continued eight days longer, and at this time she began to show symptoms, such as loss of appetite and a slight diarrhœa. On the eighteenth day she weighed 7.9 kilos. Her coat was roughened, and she was evidently in poorer condition than at the beginning of the experiment.

The injections were then stopped until February 4th, when they were again taken up, increasing the dose to 0.2479 g. From the second day on she vomited occasionally, usually consisting mostly of mucus. There was a slight diarrhœa. Her appetite was very poor. The injections were continued for six days. At the end of this time her weight was 7.1 kilos. From the six days' urine 0.589 g. and from the feces 0.014 g. lithium chloride was obtained. During the six days she had been given in all 1.5 g.

The injections were now increased to 0.62475 g. daily. This was continued for five days. During this time she vomited several times a day and had a severe diarrhœa, the stools being often streaked with blood. She ate scarcely anything, and at the end of the experiment weighed 7 kilos. She was very weak and emaciated. Coat rough and lustreless.

From the five days' urine 1.49 g. and from the feces 0.128 g. of lithium chloride was obtained. During the five days she had received 3.1 g. The injections were now stopped, but the vomiting and diarrhœa continued unabated. The appetite was completely lost, and she became weaker daily. On February 24th she was so weak that she was hardly able to stand, and as it was evident that she would soon die, she was killed with chloroform. At this time she weighed 6.8 kilos. At the beginning of the experiment she had weighed 8.2 kilos., a loss of 1.4 kilos in weight.

Autopsy. Heart showed a few small hemorrhages under the endocardium, otherwise normal. Lungs, liver, and kidneys normal. The walls of the stomach were greatly thickened and reddened, and contained several small hemorrhages. The mucous membrane of the whole bowel was thickened and reddened, though this change was most marked in the large bowel. The lower part of the large bowel contained a few small ulcers and numerous ecchymoses.

Microscopic examination of the heart showed only a few small hemorrhages under the endocardium. Lungs, liver, and kidney showed no marked changes. The examination of the stomach and bowel showed congestion and thickening of the mucous membrane, with a superficial layer of mucus and detritus, and one or two small superficial ulcers.

One hundred grammes of the muscle from the ham were burned and the ashes dissolved in 30 c.c. of distilled water. This gave a distinct

spectroscope of lithium, even when diluted to 90 c.c. One hundred grammes of normal dog's muscle when burned and the ashes dissolved in 30 c.c. gave no lithium spectroscope, even when concentrated to 5 c.c.

The ashes from 100 g. of blood taken from this dog showed lithium, even when diluted to 130 c.c. That from normal dog's blood gave only a faint spectroscope when dissolved in 5 c.c. water. It is evident from this that lithium is slowly excreted and is stored up in the body. The liver did not show as much lithium as an equal weight of muscle.

When lithium salts are given by the mouth they produce essentially the same symptoms and changes as when given hypodermically, though, of course, larger doses are required. Cats, after receiving 0.5 to 2 g. by the stomach, vomit two or three times, but otherwise are very little affected, though frequently some diarrhœa is noticed. On the contrary, when small doses are administered daily by the mouth, cats and dogs show first diarrhœa, with some blood in the stools, vomiting, loss of appetite, and weight, and finally die from the gastro-enteritis, as the following experiment well shows:

A healthy cat, weighing 2000 g., received daily for the first six days 0.062475 g. by the stomach. No symptoms at this time, though she had lost 100 g. in weight. The dose was now increased to 0.125 g. daily, which was continued for five days; during this time she developed a moderately severe diarrhœa, and at the end of six days weighed 1800 g. The dose was now increased to 0.188 g. daily, and was continued for fifteen days. During the most of this time she had a severe diarrhœa, the stools often containing blood, and during the latter part of the period she was nauseated, and vomiting constantly, and finally died of gastro-enteritis and exhaustion, weighing 1500 g. At autopsy there was found a marked inflammation of the whole gastro-intestinal tract. This was most severe in the large bowel, which contained many large and small ulcers and ecchymoses. There was also some enlargement of the abdominal lymph glands and two or three small abscesses in the liver, undoubtedly secondary infections from the bowel.

In some experiments the animals that were given lithium in small doses lost over one-third of their weight, and finally died of exhaustion and gastro-enteritis. Sixty milligrammes of lithium chloride per kilo. daily always killed dogs and cats sooner or later from gastro-enteritis. Though frequently, especially in dogs, this was much delayed by the animals vomiting the lithium solution soon after taking it.

The cause of this gastro-enteritis is undoubtedly connected with the excretion of the metal through the bowel wall. This action on the bowel is not peculiar to lithium, but is caused by many other substances, among which may be mentioned mercury, arsenic, colchicum, emetine, and aloin. These substances are excreted by the bowel, and also in the urine, and induce irritation or inflammation at the point

excreted. This may be because they collect in larger quantities in the excretory organs, or because they are here freed from some harmless combination in which they have circulated in the tissues. At times the bowels are most affected, and *at other* times the kidneys suffer most. Lithium salts are slowly excreted by the kidneys and do not seem to cause any appreciable amount of renal irritation. On the contrary, the excretion through the bowel causes marked irritation and inflammation. The percentage of lithium salts obtained from the feces in my experiments was always greater in those cases accompanied by marked vomiting and diarrhœa.

There are very few cases mentioned in the literature of poisoning from the use of lithium, and it is not generally considered as inducing any deleterious symptoms. Wood, in his text-book of *Therapeutics*, says he has seen a twenty-grain dose of lithium carbonate produce a severe general prostration in a feeble adult female; and Hare, in his *Practical Therapeutics*, says: "It is worthy of note that in some cases citrated lithium will disorder the stomach and produce vomiting." In a note to the French edition of Garrod on *Gout*, the statement is made that small doses are readily borne, but doses of thirty to fifty grains of the carbonate give rise, after a few days, to cardialgia and dyspepsia. Rabuteau states that 15 to 30 g. per diem often causes dyspepsia, and even vomiting. Climent[17] records similar results in his own person, and Althaus[18] states that lithiated waters, if taken in large amounts, give rise to sickness and diarrhœa. Kolipinski[19] reports two cases of marked tremor following the use of lithia tablets. This was also accompanied by marked general prostration and weakness. The condition disappeared in three or four days. Considering the marked effect of lithium salts on animals, it is surprising that symptoms on the part of the gastro-intestinal tract have not been noticed more frequently. It is not improbable that such symptoms have frequently been noticed, but have not been reported, or have been considered as due to other causes. It might be stated here, however, that lithium is frequently given as the natural lithia waters, which, as shown by the analyses of Harrington,[20] Waller,[21] and others contain only very small amounts of lithium, many containing none at all.

Lithium salts are frequently credited with the possession of diuretic action. To determine whether they possessed any marked diuretic action I made several experiments on rabbits, as follows: Large rabbits were anæsthetized with urethane and paraldehyde. A canula was introduced into the jugular vein and one into the bladder, so as to be able to inject the fluids into the blood and to collect the urine.

After determining the normal flow of urine, warmed solutions of equal strength of lithium chloride and sodium chloride were injected into the vein and the urine collected and measured. In order to have

the solutions contain equal numbers of molecules, they were so prepared that their freezing points were the same. Solutions containing about 3 g. and 6 g. of lithium chloride and sodium chloride, respectively, in 100 c.c. of distilled water were used, and from 30 to 50 c.c. were injected at the rate of 15 c.c. in five minutes. The results of these experiments did not show that solutions of lithium chloride caused any greater diuresis than solutions of sodium chloride.

The salt of lithium used in medicine is the carbonate. It is much less soluble than the chloride, and experiments on animals show that it produced the same effects as the chloride. The bromide of lithium has been used in the treatment of gout, epilepsy, and other nervous diseases. Dr. Weir Mitchell,[21] after using lithium bromide in several cases, concluded that it was as efficient as sodium or potassium bromide, and that its influence over insomnia was greater.

Fontan[22] found lithium bromide to possess the same sedative action as potassium bromide, but he thought it less liable to cause untoward symptoms. Dr. Mitchell, however, saw skin rashes following the use of lithium bromide. Lévy[24] found lithium bromide to possess marked sedative action, and to be less depressing to the heart than potassium bromide. He did not, however, find it to be of any special value in gout.

Since the atomic weight of lithium is so small, there is, of course, more of the bromide ion in lithium than in an equal weight of potassium bromide, and the action of the bromide ion completely overshadows the action of the lithium ion. Lithium bromide does not possess any advantages over the commonly used potassium bromide.

Conclusions. 1. Lithium is excreted in the saliva, into the stomach and bowel, and in the urine. The greater amount is excreted in the urine, though more appears in the stomach and bowel when nausea, vomiting, and diarrhœa have been profuse. It can usually be demonstrated in the secretions within ten minutes after a hypodermic injection, though its excretion proceeds slowly, for I have found it in the secretions twenty-three days after the injections were stopped.

2. Lithium salts given to animals, hypodermically or by the stomach, cause, sooner or later, fatal gastro-enteritis. This gastro-enteritis is, undoubtedly, connected with the excretion of the metal through the bowel wall.

3. Lithium salts do not possess any diuretic action that cannot be accounted for by their salt action. They render the urine alkaline, and thus act like the other alkalies.

4. Lithium carbonate, in fifteen to twenty-grain doses, and lithia tablets have been known to cause gastro-intestinal symptoms in man.

5. Dilute solutions of lithium salts are not solvents for uric acid or urates.

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URETERITIS IN THE FEMALE.

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A CONVENIENT classification of ureteritis is the following:

Simple ureteritis.

Ureteritis with obstruction.

Tubercular ureteritis.

SIMPLE URETERITIS. This form may be either acute or chronic. In the acute cases parturition seems to have a decided influence as an etiological factor. Hallé[1] and Morris[2] think that the pressure of the child's head, by causing trauma, offers a favorable soil for the development of the disease. Primiparæ are especially affected. The disease is ushered in with chills and fever, and a condition of general sepsis is the result. There is pelvic pain and vesical irritation, and pressure vaginally over the affected ureter is very sensitive. In a few days after the onset of the disease pus may be seen in the urine in large amounts. If the kidney is seriously affected the prognosis is grave, and death may ensue.

[1] Urétérite et Pyélite, Paris, 1887, p. 148.

[2] Surgical Diseases of the Kidneys and Ureters, London, 1901, vol. ii. p. 398.

The diagnosis of acute ureteritis of this nature is difficult unless one recognizes the possibility of the disease. Pyelonephritis is more easily recognized from focal symptoms. It is doubtful if simple acute ureteritis ever exists alone, and if it does, it can be diagnosed as such. Usually it is part of a pyelitis or of a cystitis, and the symptoms of these affections so overshadow those of the ureteritis that the latter escape detection.

Diphtheritic ureteritis has been found at autopsy. In the Boston City Hospital records there are 2 such cases occurring in 3424 autopsies. In the first case the bladder and both ureters were covered with the typical black membrane, and in the other the renal pelves and upper part of both ureters were affected.

Chronic Ureteritis. A ureteritis may be the sequel of either a vesical or a renal inflammation, and as vesical inflammations are more common than the renal, we usually find a chronic cystitis associated with the ureteritis. Infection from a ureteral fistula is easily understood. Infection from the diseased bladder would be more common if the valve at the ureteral opening did not act as a determined barrier to the entrance of germs, and when we consider the large number of cases of cystitis we must allow, from the relatively rare occurrence of ureteritis, that the valve does in reality act as a barrier in this way. I have seen in a case of tubercular cystitis infection resisted for five years by the remaining kidney and ureter after nephrectomy for the opposite tuberculous kidney. But that this valve does not always act in this way has been abundantly proved by the experiments of Young[1] and of Lewin and Goldschmidt.[2] They all found that injection of methylene blue under high pressure and rapidly would not result in reflux of the dye into the ureters of animals, but that if injected slowly reflux would sometimes occur. Coutade and Guyon[3] also experimented in the same direction, and found that if the bladder were injected in this way—*i. e.*, largely and slowly—reflux into the ureter occurred in two-thirds of the cases in rabbits and in one-fifth of the cases in dogs. Hallé[4] lays particular stress on the method of invasion of the inflammation into the ureter by means of direct extension of the inflammation along the mucous membrane, and he brings in support of this view the fact that lesions around the ureteral orifice and bladder are older in appearance than those in the ureter. He believes that reflux of septic urine into the canals must be of relatively rare occurrence. In the rare cases of urethral stricture in the female, the mechanism of infection is the same as that in the male. There is retention of urine in the bladder and later stagnation of urine in the ureters. This

[1] A. H. Young. Johns Hopkins Hospital Bulletin, 1898, No. 86, p. 105.
[2] Virch. Archiv, 1893, vol. cxxxiv. p. 33.
[3] Leçons Cliniques sur les Maladies des Voies Urinaires.
[4] Op. cit., p. 132.

leads to dilatation, first of the ureters and later of the ureteral orifices; infection is then easy by direct invasion into the ureters of the germs in the bladder when the bladder contracts in its expulsive efforts.

The gonococcus is the germ most to be dreaded as a cause of ureteritis, on account of its well-known disposition to result in stricture. Ureteritis may occasionally originate from calculous pyelitis, and the infection may reach the bladder, where it may cause characteristic changes, to be described later. The infection from pus-tubes, inflamed lymph glands, and pelvic cellulitis has been known to cause ureteritis, the infection in these instances travelling through the lymphatics.

The pathology of the disease is that of mucous membranes elsewhere in the body. There is reddening of the tissues and desquamation of the epithelium. Occasionally the inflammation extends through the ureter to the tissues around it. The symptoms will vary with the extent of the urinary tract involved. If the kidney has been the starting point of the disease, or if the kidney has been affected secondarily by an ascending infection, we may expect some renal pain or at least some discomfort in the lumbar region on the affected side. This sign is by no means constant, however, and it may be absent. As the bladder is generally if not always affected, the symptoms are mainly referred to it; so we find frequency of micturition the chief symptom. The desire to urinate never leaves the patient, and it constitutes the principal source of suffering. The calls to urinate vary with the degree of severity of the disease and with the stage. There are temporary remissions, but these can hardly be called remissions, as the suffering is constant, even during these. Generally the patient has to empty the bladder at least once an hour by day and several times by night. Occasionally urination is required every fifteen minutes by day and ten or twelve times by night. The act is usually painless, but sometimes pain is experienced deep in the bladder, on one side, in the vicinity of the affected ureter. The pain in these cases is of an aching character, and it may last as long as half an hour after the act of urination. Tenesmus may or may not be present, and incontinence is very rare. Perhaps the most distressing source of suffering is that caused by the excessive degree of neurasthenia which is the inevitable result of the incessant suffering and the loss of sleep. The patient is very apt to lose flesh, is irritable, peevish, and has no object in living. The digestion is disturbed and constipation is common. Headaches are experienced and also the typical pressure feeling on the top of the head, as well as the various neuralgias so often accompanying severe degrees of neurasthenia.

The most important sign on physical examination is the greatly increased tenderness of the affected ureter when pressed upon vaginally as compared with the opposite ureter. When the ureter is thus pressed upon there is a coincident extreme desire to urinate, which is with diffi-

culty controlled by the patient. If the ureter has been diseased a long time it is possible that there may be some enlargement which may be discovered vaginally. It is difficult to see how a moderately thickened ureter could be felt through the abdominal walls unless these were very thin or relaxed. But pressure along the course of the ureter is often elicited, especially at the pelvic brim, and this is an important diagnostic sign.

On cystoscopic examination the trigone and vesical neck will be found congested to a more or less degree. There may be patchy cystitis on the posterior wall, but usually if the affection has lasted some time the bladder as a whole will present a relatively normal appearance. The most important sign which I have observed in these cases of simple ureteritis is swelling of the ureteral eminence on the affected side. As compared with its fellow on the opposite side it is much larger, especially if viewed with the patient in the knee-chest position. Besides this, it is invariably red and at times streaky, the streaks proceeding from the ureteral opening. The entrance to the ureter on the summit of the eminence is swollen and puffy, and at times the mucous membrane inside the canal may be everted so that it presents as a small red spot. Ulcerations are rare even if the affection has lasted for years.

There is one sign presented by the examination of the urine which I have found of the greatest diagnostic importance, and this is an excess of desquamated epithelium, which may or may not be associated with the presence of pus on the affected side. This epithelium may be free or in sheets, and it is medium-sized or small, round, or spindle shaped, or even squamous. If the inflammation is confined to the ureter, and the renal pelvis is not affected, pus is always in very small amounts, and, as has been mentioned, may be entirely absent or imperceptible. This same peculiarity is also seen even in the tubercular forms of ureteritis if the ureter alone is involved—*i. e.*, there may be a considerable excess of epithelium, and very little pus. Occasionally blood corpuscles are seen, and if the kidney has been invaded a few granular and hyaline casts may be found.

The utmost care must be taken in collecting the urine from the ureters so that there shall be no admixture with vesical elements, and also that trauma during instrumentation shall be avoided. For this purpose the only serviceable cystoscope is that of Kelly, which has the oblique end. With this instrument the urine drops into the end of the tube directly from the ureter, and may be collected in a bottle at the outer end of the tube.

Reynolds[1] has called attention to the fact that the amount of urea on the affected side as compared with the opposite side is diminished,

[1] Gynecological Transactions, 1896, No. 21, p. 282.

and he brings eight cases in support of this view. My experience has been similar, and I am inclined to think that the ureteral inflammation must exert an inhibitory effect on the excretion of the urinary solids. I have observed the same peculiarity in a case of renal calculus associated with ureteral calculus, although the kidney when removed, with the exception of the stones in it, was apparently healthy, there having been no suppuration. The separated urines before operation showed a marked difference as regards the urea excretion in favor of the sound side.

The amount of urine will often be scanty, and Mann has seen it as low as 180 c.cm. in the twenty-four hours. It is usually acid in reaction, and has a low specific gravity. It must not be supposed that the amount of urine is always low, for cases will be met with in which the amount is normal or nearly normal.

The diagnosis of simple ureteritis is sometimes a very difficult matter. Most frequently it is not recognized at all, and the case is treated for years perhaps as a chronic cystitis or as a reflex bladder trouble of nervous origin. It is well then in the presence of such a case to proceed at once to a cystoscopic examination. This gives the most important aid in making a diagnosis. The characteristic lesions of the ureteral eminence of the affected side combined with the swollen appearance of the eminence itself, and also the study of the urinary sediment, will direct attention to the seat of the trouble and will be sufficient to establish the diagnosis. A vaginally tender ureter is an important sign.

There is one affection of the ureter with which ureteritis may be confounded, and that is ureteral stricture; but as stricture is a sequel of the disease, and as ureteritis always accompanies stricture, this is perhaps not the best way to put it. If stricture is suspected on account of the long duration of the case, passing graduated bougies will at once clear up the diagnosis. Tuberculosis of the ureter as a primary affection probably never occurs alone, and need not enter into the differential diagnosis. It is always a part of a renal or a vesical tuberculosis, or both, and the symptoms and signs of either are usually sufficiently marked to allow of a diagnosis being made. Salpingitis and ovaritis may be mistaken for ureteritis, and the failure to relieve symptoms by removal of the ovaries and tubes may be due to the fact that the coexisting ureteritis was not recognized. This error ought not to occur. Other inflammatory pelvic disorders, such as appendicitis, have been mistaken for ureteritis; a careful study of the case will clear up the diagnosis.

The prognosis of the disease is very poor if it has lasted a long time; but if recognized early, and it has been properly treated, the prognosis is encouraging. In the very chronic cases treatment has been very unsatisfactory, and alleviation of symptoms has been all that has been

accomplished. All methods of treatment have been tried, but most of them have been found to be of little value. The difficulty lies in the fact that the disease is situated in such a small tube in the centre of the body that it cannot be reached by direct means. The treatment has been largely palliative, therefore, and has been confined to the administration of drugs combined with general hygienic measures. Much may be accomplished in this way, and these measures should always be insisted upon. As a preliminary to treatment a diseased tube or ovary, if it lies over the course of the ureter, should be removed. The same applies to other diseased pelvic conditions. The diet should be carefully regulated with reference to the kind of food given. It should be bland and nutritious. Too much nitrogenous food should be avoided, and also those foods which tend to make the urine irritating, such as asparagus and rhubarb. A simple diet of farinaceous food should be given, such as eggs, soups, broths, fresh green vegetables, the white meat of poultry and game, occasionally beef, mutton, or lamb, plenty of milk, and, above all, a large amount of water. If the stomach is irritable it may be difficult to select the proper diet. Mann has seen excellent results follow a restricted milk diet. Attention to the bowels is of importance, as a loaded colon pressing on the ureter is productive of pain. The function of the skin should receive attention, and hot baths and rubbings are recommended. The patient should take the fresh air every day, if she is able to be out and if exercise is not fatiguing; if it is, sitting out in the air is the next best thing.

Regularity of living is essential. The patient should retire early, and she should likewise take a good deal of rest in the recumbent position in the day-time. Overexertion invariably aggravates the condition. The drugs usually of benefit in vesical inflammations may be tried. If the urine is acid, decided benefit will be derived from giving acetate of potassium in large doses. Sandalwood oil sometimes relieves symptoms, but it is irritating to the stomach. Urotropin is sometimes of value, but it appears to do most good in cases in which there is a large amount of pus in the urine. Bicarbonate of soda in large doses may be tried, particularly if there is acidity of the stomach; it is sometimes of great value. Alcohol should be avoided. For general tonics, iron, arsenic, and strychnine may be given. Morphine should never under any circumstances be given, on account of the great danger there is of forming the habit. Patients tolerate the disease many years without recourse to morphine, and it is quite unjustifiable to use it. A good remedy for sleeplessness is trional; one or two 10-grain doses at night will generally give some sleep, and it may be freely used. No habit is formed, and it may be withdrawn at will.

Topical applications to the bladder have done much good in these cases. A solution of nitrate of silver in a 5 or 10 per cent. strength

applied to the trigone and to the ureteral eminence once or twice a week gives considerable relief. A vesical injection of a 5 per cent. solution of protargol or a 50 per cent. solution of ichthyol have proved satisfactory. About 2 drachms of either may be injected, and the injection should be retained at least half an hour.

The rational method of treating the ureteritis itself would seem to be by means of topical applications to the ureteral canal. The instrument shown in the figure is one which I devised for injecting the ureter through a cystoscope in the bladder. It consists of a long, straight silver tube with a blunt-pointed extremity and a bulbous expansion a short distance from its end. A rubber tube connects the instrument

with the reservoir bottle containing the fluid to be injected, which fluid is forced by air pressure into the silver tube by means of a rubber hand-bulb. By working the hand-bulb the silver tube is filled with the fluid, and in this condition, the air having been thus expelled, it is introduced into the ureteral orifice. The instrument enters the canal, and is pushed along it until the bulbous expansion reaches the ureteral orifice. A little extra pressure is now exerted so that the bulbous expansion may come in close contact with the orifice in order to prevent regurgitation of the fluid injected. Quite considerable pressure with the hand-bulb is now exerted, and the ureter and renal pelvis are injected. That the fluid is really injected is evidenced by seeing it come out of the ureteral orifice in a strong stream when the instrument is with-

drawn. The patient experiences some pain in the ureter, but it is tolerable. Occasionally she complains of some backache in the region of the kidney injected. I have proved by an experiment on the cadaver that the whole renal pelvis can be injected in this way. A solution of methylene blue was used and the instrument used in the way described. When the kidney and ureter were subsequently opened they were found to be deeply stained with the dye; all parts of the renal pelvis were of an intensely blue color. The only solutions which I have yet tried, for the instrument is new, have been boracic acid, 2 per cent., and nitrate of silver, 1 per cent. They were well tolerated. The treatment was done in my office, and the patient returned home unaccompanied. As to the results of this treatment it is too early to say, for I have done it only a few times. The patients upon whom it was tried always experienced relief after the applications, especially during the night following the treatment, and they had to get up to urinate less often than ever before.

If all means have failed to relieve the symptoms and these are urgent, the only remedy left is the making of a vesicovaginal fistula; but even this will not in all cases relieve the symptoms wholly, for the irritation, being in the ureter, is still present, and the nagging desire to urinate although relieved in a measure, may not entirely disappear. If there is well-marked cystitis the fistula should be made; some relief will be sure to follow.

Mrs. F. P., first seen in December, 1899, was forty-three years old, had been married twenty years and had had seven children. Three years before she had an attack of severe colic in the lower part of the abdomen, the attack having come on immediately after the birth of the youngest child. Since then there has been urinary trouble. When first seen she was urinating every few moments, the pain being always felt on the left side of the bladder, in the vicinity of the left ureteral orifice and ureter. Besides this there was also pain in the urethra. There were some dyspeptic symptoms attended with flatulency and constipation. The general health was poor, and she was very nervous and irritable at times, and her sleep was much disturbed.

An examination showed a lacerated cervix and perineum, cystocele, and rectocele. Abdominally both kidneys were negative, but upon pressure over the course of the left ureter it was sensitive, especially at the lower end, and vaginally the finger discovered a very sensitive and somewhat enlarged ureter, which when pressed upon excited an intense desire to urinate. A cystoscopic examination showed a red urethra, vesical neck, and trigone. The left ureteral eminence was larger than the right one, and it presented a swollen and puffy appearance; it was quite red, and its orifice was somewhat pouting. The right ureteral urine collected with the oblique-end cystoscope was normal. The left ureteral urine was acid in reaction, and its sediment, evident to the eye and imparting a turbidity to the urine, showed a great excess of medium and small round cells, likewise numerous caudate and spindle cells, as

well as a few casts and some blood corpuscles; there was no pus. There was one peculiarity which was particularly noticed while collecting the ureteral urine which I have not before observed in any case, and this was that while the right ureteral urine came away in strong jets at frequent intervals, the left ureteral urine was scantier in amount and came away in jets occurring at longer intervals than on the right side. By estimation only half the amount of urine flowed from the left ureter during the time that twice the amount flowed from the right, and the jets on the left side occurred at twice as long intervals as those on the right, and they were feebler in force. This observation is in line with the diminished urea excretion in these cases.

The patient was put upon a regulated diet, and was told to drink a large amount of water and to take the fresh air every day. Besides this, local applications of nitrate of silver in the strength of 5 and 10 per cent. were made to the trigone and ureteral eminence every few days for a long time. After having been under treatment a few months she underwent an operation for the cure of the lacerations. The operation was successful, and since it was performed the bladder symptoms have been decidedly less troublesome. The internal medication consisted in taking urotropin, acetate of potassium, and bicarbonate of soda. Later, injections of a few drachms of a 5 per cent. solution of protargol into the bladder, which were retained half an hour, seemed to do a great deal of good. Most relief has been obtained by injecting the ureter with a 1 per cent. solution of silver nitrate at intervals of a few days. On the whole the patient is decidedly better, but she is by no means well, and still suffers a good deal from the pain on the left side of the bladder; and urination, while it has been reduced by the treatment to four or five times a day and once or twice at night, is still quite painful. The case illustrates very well how meagre our therapeutics are in this class of urinary disease. The patient has been very faithful in following every detail of treatment during the past three years, and while she is by no means well, she considers that she would have been much worse had she not been under treatment.

Ureteritis with Obstruction. The obstruction may be partial or complete, and, according as this is the case, symptoms and changes will vary. The changes differ also according as infection has taken place or not. If it has not taken place, and the obstruction is complete, we may get simple hydronephrosis. If this happens on one side only it may be the only permanent change, and the final result, if the obstruction is not removed, is complete atrophy of the kidney. Inflammatory changes in such a case are likely to supervene if the obstruction has been caused by an inflammatory mass pressing upon the ureter, such as a purulent salpingitis. In such an event pyonephrosis becomes engrafted upon a hydronephrosis. Infection in such a case may also proceed from the kidney itself, the result of germs excreted by it. Albarran[1] has shown that secondary infection is common and that the germ most frequently found is the bacterium pyogenes.

[1] Etude sur le Rein des Urinaires, Paris, 1889, p. 105.

The causes of strictured ureter are given by Morris as follows: (1) Valve of mucous membrane near renal pelvis; (2) valve caused by obliquity of ureter to renal pelvis; (3) fibrous stricture (gonorrhœal); (4) ureter compressed by branch of renal artery; (5) calculus in the ureter; (6) fibrous band at the brim of the pelvis; (7) twist of the ureter on its long axis; (8) compression of the ureter by enlarged lymphatic glands; (9) conversion of the ureter into an impervious cord. Of all these causes, those which are usually associated with inflammatory changes are fibrous stricture and calculus. These two only will therefore be discussed.

Obstruction may be partial or complete. By partial obstruction is meant that the urine always has sufficient passage to flow through the narrow canal, and that the stricture is never so tight as to even temporarily occlude the urinary canal at the diseased point. The symptoms of this class of cases will proceed, therefore, from the accompanying ureteritis rather than from the stricture itself. By complete obstruction is meant that the canal is completely occluded or that it is subject to intermittent closures. The result is practically the same—ultimate disorganization of the kidney above.

Partial Obstruction. Fibrous Stricture. The chief cause of fibrous stricture is gonorrhœal infection. The stricture may, however, result from ureteritis from other infections, and also from trauma inflicted by the passage of a renal calculus. Occasionally external inflammation around the ureter will result in stricture. It is very probable that many cases of strictured ureter in the past have been diagnosed as neuroses, cystitis, hyperæmia of the vesical neck and trigone, reflex irritable bladder, etc., because the chief symptom of the disease is frequency of micturition. This obscurity has been due to the difficulty of arriving at the correct diagnosis, for it is made solely by instrumentation. The duration of the disease, untreated, is practically chronic. In one of my cases the duration was twenty-five years, the patient having suffered all that time. The symptoms of the gonorrhœal cystitis glide imperceptibly into those of the ureteritis; and as they are nearly identical, the patient is treated for the cystitis alone, and no attention is paid to the ureter, the chief seat of the chronic disease.

The symptoms of the disease are those of simple ureteritis, and they need not, therefore, be repeated in detail. We have the renal pain and distress if the kidney has been invaded; it is not usually marked, and it is not elicited, as a rule, from the patient unless special attention is directed to it. The urinary symptoms are in part due to the cystitis usually present in these cases, in part to the inflammation of the ureter itself, for we find when the cystitis is cured or almost cured that frequent micturition, attended or not with pain, still persists. The chief distress comes from the constant desire to urinate, which

never leaves the patient. This desire to urinate is peculiar. The patient is never satisfied, and she always feels that if she could only empty the bladder satisfactorily she would be relieved. The phrase "nagging desire to urinate" was used by one of my patients to describe the sensation felt. Tenesmus and incontinence are the same as in simple ureteritis. Neurasthenic symptoms, as one would expect from the long duration of the disease, are of a marked character. The patients are wretched and miserable. The tender ureter is found vaginally, and the cystoscopic appearances are the same as in simple ureteritis, and need not be repeated. The streaky appearance of the eminence and the swollen eminence itself are noticed. The separated urines have the same characteristics as in simple ureteritis without stricture, and I would especially insist on the presence or excess of desquamated epithelium on the affected side, with or without pus and blood corpuscles. The total amount of urine may be diminished, and a quantitative analysis will show a diminished excretion of solids. It is acid, of low specific gravity, and may contain a slight amount of albumin.

The diagnosis is at once made with the ureteral bougies. On passing these in turn into the ureter one will be found which will be arrested at a certain point, the seat of the obstruction. If more than one stricture exists in the same ureter the diagnosis of the high ones is impossible unless the lowest one is of greater calibre than the higher. There are normal narrowings in the ureter, and the mistake should not be made of confounding these with pathological strictures. These normal narrowings are found, according to Van Hook,[1] at the following points: the first is at a point between four and seven centimetres from the renal pelvis, the second is where the ureter curves over the pelvic brim (in three out of five), and the third is at the junction of the vesical and ureteral portions.

The prognosis of strictured ureter has been sufficiently intimated. It is a long-standing affection, and it is very difficult to cure. The chief source of danger is on the part of the nervous system, which is constantly irritated; and even if the patient is cured, months may elapse before the mental equilibrium is re-established.

The treatment of the affection should have for its end the complete restoration of the lumen of the canal. Dilatation of the stricture has been proposed, and it has this to recommend it, that it does not involve a cutting operation. The number of reported cures by this method of treatment is as yet so few that we cannot form any idea of its position as a therapeutic measure. We do know, however, that it will give relief from symptoms. The chief objection to the method is that it is extremely painful at times. Urinary fever and chills occasionally follow

[1] Surgery of the Ureters, Journal of the American Medical Association, December 1, 1893.

ureteral dilatation, and Morris[1] relates a case in which the vesical orifice of the ureter was torn in an attempt to dilate a high stricture. The orifice subsequently became completely closed. If it is desired to attempt dilatation it is best to use either Kelly's graduated renal catheters or the French ureteral bougies. These should not be passed more than once or twice a week. If gradual dilatation fails, or if the patient will not submit to it, one of the operations recommended for the cure of the condition may have to be performed. The best one is that which exposes the ureter through an extraperitoneal incision after preliminary introduction of a ureteral catheter. The stricture may then be cut upon the catheter and the two angles of the incision united together by means of fine sutures. The sewing should not be done until the rest of the canal has been explored for high strictures. If the stricture is of great length, and it happens to be situated near the bladder, it is advisable to transplant the ureter, which may be cut off just above the stricture, into the summit of the bladder. Any stricture below the pelvic brim may be treated in this way. If there is a long stricture high up, and transplantation is not practicable, the only other resource is nephrectomy or the establishment of an artificial loin fistula. The condition of the opposite kidney and the general state of the patient should be considered in choosing between the two operations. Simple cystotomy in these cases has been tried, but the relief given thereby is very slight, because the spasm and pain, dependent as they are, upon the ureteral lesion, continue just the same after the cystotomy. This has been the experience of others as well as my own.[2] The only indication for cystotomy is coincident violent inflammation of the bladder.

Miss M. F., first seen in June, 1896, was forty-five years old. The vesical symptoms came on immediately after an attack of gonorrhœa, twenty-five years previously, and she has never been free from vesical suffering since then. The first symptoms of acute cystitis glided imperceptibly into those of chronic cystitis and ureteritis. There was increased frequency of micturition, attended with pain, and there was great distress from the constant desire to empty the bladder, which was never absent. There was a good deal of tenesmus, but never incontinence. Some pain was experienced in the region of the right kidney and also along the course of the right ureter at the level of the pelvic brim. There was some backache. Sleep was much disturbed, and the nervous system was a complete wreck. She was very irritable, had no object in living, and frequently threatened to commit suicide. On examination there was no tenderness over either kidney, but later this sign was present over the right one. Along the course of the right ureter there was no tenderness except at a point just above Poupart's ligament; here there was a good deal of sensitiveness on pressure.

[1] Surgical Diseases of the Kidney and Ureter, London, 1901, p. 440.

[2] See case reported by H. A. Kelly in Johns Hopkins Hospital Bulletin, 1891, p. 240.

Vaginally the right ureter was somewhat enlarged, and pressure on it was very painful and excited an intense desire to urinate. On cystoscopic examination the urethra, vesical neck, and trigone were much congested, and the right ureteral eminence, which was redder than the rest of the bladder, also had a streaky appearance; it was larger than the left eminence. The right ureteral urine showed a sediment of a great excess of epithelium, some casts, and an appreciable amount of pus. The left ureteral urine was not remarkable. The stricture of the ureter was not discovered for a long time, because it was not thought best to pass a catheter into the ureter through the infected bladder. In a similar case with a history of gonorrhœa it would be justifiable to do so.

The treatment of the case was that recommended for cystitis and ureteritis; but after a few months of treatment, no great improvement having been accomplished, a vesicovaginal fistula was made. This gave a tolerable existence for as long a time as it was allowed to remain open, which was five years. During this time she was relieved from the necessity of emptying the bladder, but she still had the nagging desire to urinate, which persisted in spite of the free drainage afforded by the fistula. When the fistula was closed, at the urgent solicitation of the patient, the old symptoms returned. In October, 1901, the stricture was discovered in the right ureter, at a point eight centimetres from the ureteral eminence. The stricture admitted a 1-millimetre probe. Dilatation was at once begun, and it soon admitted a 3-millimetre probe. Relief followed, and the nagging desire to urinate became much less in a short time; but it did not entirely disappear, and it has not up to the present time, owing to the persistence of the ureteritis. Lately injections of the renal pelvis have been instituted, and were given with the apparatus described in this paper. These have been well supported, and have given further relief. The patient is now in the best condition that she has ever been in, the ureteral injections always relieve her, and she usually has a good night's rest after the treatment. There is still an excess of epithelium on the right side, but the pus has entirely disappeared.

Calculous Obstruction. It is not intended to enter into a complete discussion of calculous disease of the kidney and ureter, for that would extend the limits of this paper far beyond that intended. Reference will be made in a brief way to the symptoms and diagnosis of the affection and to the consequent ureteritis which it entails.

The narration of a typical case is perhaps the best way to describe the disease.

Mrs. F. C., aged twenty-five years, was first seen in July, 1898. She had been operated upon by Dr. W. H. Baker, of Boston, for salpingitis, in February, 1898, and panhysterectomy was performed Seven years previously there had been an attack of true renal colic caused by a renal calculus, which was subsequently seen when passed *per urethram;* since then there had been urinary trouble. Five years after the onset of the trouble there was an attack of hæmaturia, the blood persisting for two days. The usual symptoms of cystitis and ureteritis were present. There was frequent and painful micturition, attended with tenesmus. In addi-

tion to this there was constant pain in the left hypochondriac and lumbar regions, which pain radiated into the bladder and vulva. Decubitus was always painful on the right side, and riding in the cars was painful as well as movements of a sudden nature. On physical examination there was no tenderness on pressure over either kidney, but there was a good deal of tenderness over the left ureter when it was pressed upon at the pelvic brim, and pressure on the ureter vaginally was very painful, and in this part of its course it was enlarged. On cystoscopic examination the urethra, vesical neck, and trigone were found to be scarlet red, and the whole bladder wall was streaked with red streaks one or two centimetres long and one or two millimetres wide; there were likewise small patches of the same nature scattered throughout the bladder. The left ureteral eminence was larger than normal, and on its surface, as well as on the surface of the trigone about it, there were very many small, yellowish dots, one millimetre in diameter, circular in outline, and of punctate appearance, as though punched out with a punch. The eminence bled easily on being touched. Scattered throughout the bladder were many small, whitish elevations (enlarged lymph follicles), resembling sago grains. The right ureter was easily catheterized, but not the left, owing to a tight stricture of the ureter situated eight centimetres from the bladder. The right ureteral urine showed a urea percentage of 1.13 per cent., and was of pale color, of acid reaction, and the sediment, considerable in amount, showed some pus free and in clumps, a few caudate and medium-sized cells, and a few granular and hyaline casts. The left ureteral urine, collected with the Harris segregator, showed a urea percentage of 0.4 per cent.; it was of pale color, of acid reaction, and the sediment was the same as in the right ureteral urine, except that the amount of pus was much larger. No tubercle bacilli were found in any of the specimens of urine, and guinea-pig tests were negative as regards tuberculosis. The treatment of the case was at first palliative, but as the pain in the kidney became more severe an exploratory incision was made in February, 1900. A large stone was found in the pelvis of the left kidney, and, as there were several other stones in the renal parenchyma, the kidney was removed. The stones were of the calcic oxalate variety. A probe passed into the ureter was arrested at the pelvic brim, and an X-ray picture taken later showed the obstruction to be a stone. Subsequent events justified leaving the stone in the ureter, for it has never given any trouble. No special treatment was given for the cystitis after the operation, and when the patient was last seen, in January, 1902, the bladder was perfectly normal. As she complains of pain in the right kidney occasionally, it is feared that there may be a stone in it as well.

What is most remarkable in the case is that while the bladder was the seat of violent inflammation, the renal pelvis was of normal appearance, in spite of the presence of calculi in it. The suggestion is at once offered that the stone in its descent was arrested by the pus-tube, and that ureteritis followed by continuity; the inflammation then spread downward into the bladder, and not upward at all. I would especially call attention to the vesical appearances in this case. The small punctate ulcers were quite characteristic, and I have never seen them in any other bladder that I have examined. Their grouping around

the affected ureter suggests a causative relation between them and the calculus, but one cannot draw conclusions from a single case.

The diagnosis of ureteral calculus may be made by a careful consideration of the details of the case. Occasionally[1] stones are lodged in the ureter, and they give no symptoms at all, and they may be passed several months later without discomfort. Usually, however, there is a history of previous pain in the kidney and along the course of the ureter, and there may have been attacks of renal colic with hæmaturia. If the patient has seen calculi in the urine, additional evidence is thereby furnished. The vesical symptoms are suggestive and point to cystitis, although there are cases of concomitant vesical irritability in which no true inflammation exists in the bladder, the irritability being due in such cases to reflex causes. The examination of the urine will throw considerable light on the nature of the disease, particularly the examination of the separated urines, and it is far better in securing the separated specimens to make use of Kelly's oblique-end cystoscope in order that adventitious blood corpuscles may be absolutely avoided; this, in view of the fact that it frequently happens that the blood in the urine in cases of calculi of the upper urinary passages is sometimes very scanty in amount, while its diagnostic importance is very great. The absence of pus does not exclude calculus, for it will not be found if infection has not taken place. The lessened urea excretion on the affected side is characteristic and shows the effect of inhibitory influences. The same peculiarity may be noticed in cases of ureteritis, as has already been mentined. Cystoscopic appearances are suggestive. The punctate ulcers may prove to be of diagnostic importance, but as I have seen but one case it may merely go on record; confirmatory evidence is needed. Occasionally the ureteral stone may be felt through the vagina, and in such a case the diagnosis is at once plain. Finally, the X-ray may be employed in determining the diagnosis, and the wax-tipped bougie may be passed. Abbe[2] records 27 cases of stone detected in the ureter by means of the X-ray. Leonard[3] in a series of 206 cases had 65 positive results. In these cases ureteral calculus was more frequently found than renal. Leonard believes that some skill is required in reading the negatives, for the shadow of the stone is not always distinct.

The differential diagnosis lies between cystitis, ureteritis alone, appendicitis, and other pelvic inflammatory affections. Tuffier[4] called attention to the fact that a concretion lying in the appendix will sometimes give a radiograph picture which closely simulates stone, and he advises passing a wire into the ureter in order that it may be photo-

[1] Fenger. American Text-book of Genito-urinary Diseases and Syphilis, 1898, p. 496.
[2] Annals of Surgery, August, 1899, p. 198.
[3] Philadelphia Medical Journal, February 11, 1902, p. 222.
[4] La Semaine Médicale, August 9, 1899.

graphed with the concretion; the different locations of the wire and the concretion will readily eliminate stone in the ureter. It would seem that symptoms on the part of the bladder, including cystoscopic examination and urinary analysis, should direct attention to the true cause of the disturbance. This applies also to other pelvic inflammations, such as prolapsed and adherent ovary, etc., but the possibility of both affections being present should be borne in mind.

The prognosis depends on the degree of obstruction and whether infection of the upper urinary passages has taken place or not. If it has not taken place the patient may have the disease for many years, and suffer meanwhile from the kidney, ureteral, and bladder symptoms, which become tolerable. If infection takes place, general symptoms of a more severe nature occur, and surgical interference may be imperative. If the kidney has become diseased in consequence of the obstruction, and the obstruction is finally removed, the renal function may be resumed, and repair takes place in the renal tissue, but obstruction must not have lasted more than a few months.

The treatment of partial calculous obstruction will depend on the length of time the calculus has been lodged in the ureter. Occasionally it may remain in the ureter some days, and is then passed; it is well, therefore, not to be in too great haste before relieving the obstruction. When, however, the obstruction has existed an appreciable length of time, operation should be decided upon. In all cases the operation should be extraperitoneal, for it is possible to reach the ureter in any part of its course by appropriate incisions. The ureter having been exposed, the stone is removed, the incision in the ureter closed by fine sutures, and the external wound closed, with drainage. In a list of nine cases cited by Fenger[1] seven were of the extraperitoneal variety and two of the abdominal; six of the former recovererd and one died; and of the latter, one recovered and one died. In seventeen cases recorded by Tuffier and mentioned by Fenger, only three died, and in these three patients the opposite kidney was diseased. If the kidney is damaged, or if there are stones in the renal parenchyma, the question of nephrectomy comes up. If the kidney is removed it may not be necessary to remove stones in the ureter, because they may become encapsulated and may give no further trouble; but one must be sure that there is no secondary periureteritis around the stone before it is abandoned in this way. Sometimes the stone has almost reached the bladder, and may be seen with the cystoscope projecting at the ureteral orifice; an alligator forceps will often succeed in removing it.

Complete Obstruction. Fibrous Stricture. As has already been stated, fibrous stricture may exist in the ureter for many years

[1] Loc. cit., p. 499.

without ever becoming so narrow as to completely occlude the lumen of the canal; but there are cases in which the narrowing progresses gradually until the canal is finally completely occluded either intermittently or permanently. The subsequent changes being the same in either instance, we may therefore consider them both in one class. The inevitable result is pyelonephritis in the kidney above.

Acute obstruction of the complete variety, caused by a virulent germ, gives rise at once to acute pyelitis and pyelonephritis, the symptoms of which are of such a marked character that there is usually no difficulty in making the correct diagnosis.

The chronic cases, on account of the obscure symptoms, are of greater interest. One would naturally suppose that a chronic pyelonephritis in which the cause has been a stricture of the ureter would present symptoms referable to the kidney of so pronounced a type that there would be no difficulty in diagnosing the renal affection at once. Such is not the case. A kidney will sometimes go on to complete destruction without ever giving more pronounced symptoms than an occasional backache or uneasiness in the lumbar region. In these cases the vesical disturbances are the chief cause of suffering. One would also suppose that the general health would suffer to such a degree in these cases as to constitute a symptom of prominence; but I have seen a case in which the patient, a robust woman, maintained her general health and strength, as well as her mental equilibrium, to a marked degree, and she had suffered for many years from her stricture and from the ureteritis and pyelonephritis accompanying it. I would not be understood as saying that with a pyelonephritis the general health is never seriously undermined, for this is not the case, and the majority of patients will present general symptoms of a marked character; but I insist that even in these cases the kidney may not attract attention to itself by such decided focal symptoms as to direct attention to itself as the chief cause of disturbance. Watson[1] has recorded a very remarkable case of double-strictured ureters, which is of such interest that I wish to refer to it briefly. The patient was a young man, aged twenty-one years, who had contracted gonorrhœa one year previously. The inflammation had apparently subsided, and there was no symptom to indicate that the kidneys were damaged; but after exposure to cold a year after the apparent disappearance of all symptoms the patient was suddenly seized with chills, fever, and general prostration. The urine was diminished in amount and contained some pus and albumin; then for the first time a tumor was noticed in the left hypochondriac region, which was incised; the contents were purulent urine. Death ensued five days after the onset of the acute symptoms. At the autopsy strictures were

[1] Journal of Cutaneous and Genito-Urinary Diseases, No. 9, p. 407.

found in both ureters. The right kidney was the seat of extensive pyelonephritis, and the left one was transformed into a pyonephrotic sac. There had been no symptom on the part of the kidneys to attract attention to them. Watson in the same article refers to five other cases of a similar nature, only one of which was in a female; of the whole six cases, in three there were no focal symptoms on the part of the kidneys until within three days of death. In all six cases strictured ureters, with subsequent pyelonephritis, were present.

Secondary changes in the ureter are dilatation above the point of stricture and great thickening of the fibrous coat of the tube. The dilatation may be so extreme as to readily admit the forefinger into the lumen. Rupture is rare, although it may occur. Below the point of stricture the ureter is inflamed, and the inflammation may extend into the bladder. In the kidney the inflammatory changes are those usually seen in pyelonephritis. Dilatation of the renal pelvis occurs in the first instance if the obstruction has been gradual, and finally the inflammation attacks the cortical and medullary substance, producing in them abscesses of small and large size. The kidney is finally reduced to a mere capsule, inside of which there are septa which mark the site of previous abscesses. The entire renal tissue has been destroyed. If the patient survives, and nothing has been done, the final stage may be inspissation and drying up of the pus, and the process comes to an end. Such a result is hastened by the establishment of a fistula in the groin, either as the result of an operation or from natural causes; but the patient may succumb to the effects of the disease before this occurs, and death is usually due to some acute inflammatory exacerbation. Before concluding the subject of secondary changes it may be observed that the same changes may occur in consequence of stricture of the urethra in the female, and that in these rare instances both ureters are affected. A remarkable example of this sort is recorded by L. B. Tuckerman,[1] in the case of a girl, only five years old. She had always suffered from enuresis, and on one occasion only had had pain in both loins. There had been hæmaturia also. At the autopsy both ureters were found dilated and diseased as well as both renal pelves. The entire urinary tract was in a state of purulent inflammation. There was stricture of the urethra, of what nature is not stated.

Symptoms. The symptoms referable to the bladder are those principally complained of. They are the usual symptoms of cystitis, and need not again be enumerated in detail. Pain attending the act of micturition may be present or absent. When present it may be extreme, causing the greatest agony. Pain along the course of the ureter may sometimes be experienced, but as a rule it is not of diagnostic

[1] New York Medical Record, February 15, 1902, p. 280.

importance. Of the renal symptoms, pain is the principal one when it does occur. The pain is referred to the loin or the hypochondriac region, and may radiate into the lower part of the abdomen, even into the labium of the side corresponding to the diseased kidney. A dull aching in the loin is often complained of, and a feeling of distress especially on exertion. Sometimes the pain is not at all localized, and may be felt as a general backache in the lumbar region, being equally severe on either side. Fever is by no means a constant symptom, and Albarran[1] has shown that in more than one-half the cases of renal suppuration caused by obstruction, fever is entirely absent. There may, however, be acute attacks of pain in the kidney, and these may be accompanied by prostration, with nausea and vomiting, sweating and fever. In such cases we may suspect a temporary complete occlusion of the stricture by a shred of necrotic tissue. During such an attack there is elevation of temperature, with chills and fever and general prostration, which last until the lumen of the canal has become patent again. The urine during an attack is clear, and when the attack is over there is a large discharge of purulent urine, which brings relief with it. As for general symptoms, they include headache, anæmia, muscular weakness, disinclination to work, fatigue on slight exertion, and gastro-intestinal disturbances. The latter are very commonly found accompanying renal affections. The duration of the foregoing symptoms may be many years if the condition is not properly recognized and treated.

On physical examination we may derive important information. Bimanual examination of the bladder sometimes elicits pain; and if we examine the suspected ureter at the same time we may find that it is enlarged and boggy if the stricture is low down and the obstruction is complete, so that a condition of pyoureter exists. If the ureter is very much enlarged it may be felt abdominally, but the cases are rare in which this can be done. Over the kidney region, in the hypochondrium, just below the ribs, pressure with the hand will generally evoke resistance of the abdominal muscles. This is a valuable sign indicative of inflammatory renal disease. Bimanual examination of the kidney may detect enlargement if this is present. Fluctuation is rarely detected unless there is a large amount of fluid in the kidney.

The changes viewed through the cystoscope may be those seen in a chronic cystitis with constant reinfection. There is great injection, affecting the whole surface of the bladder, especially in the neighborhood of the vesical neck and trigone. Small superficial ulcerations are scattered about here and there, especially in the vicinity of the ureteral orifice corresponding to the diseased side. The ureteral orifice is

[1] Étude sur le Rein des Urinaires. Paris, 1889, p. 106.

sometimes quite deeply eroded if ulcerative changes are at all marked, and there may be considerable difficulty in locating the orifice, owing to the destruction of the landmarks. In such a case the opening may be sometimes found by seeing a gush of pus and urine well up from the bladder, in the vicinity of the spot where the eminence should be. The separated urines give evidence of value. On the affected side pyuria is marked. The amount of pus is always excessive, and collects at the bottom of the glass in quite a deep layer. This large amount of pus is quite diagnostic of pyelitic affections. Hallé[1] relates a case in which toward the end of life 300 grammes of pus were voided in twenty-four hours. The pus may have a fetid odor. Albumin is present in large amounts. The specific gravity is very low, and the reaction is usually acid unless the infection has been produced by one of the germs giving rise to alkalinity, such as the proteus vulgaris.[2] The sediment contains the usual elements—casts, various forms of epithelia, and blood corpuscles.

Some difficulty will sometimes be experienced in passing the stricture with even a small-sized ureteral catheter; usually, however, with patience and continued effort this difficulty is overcome. When the stricture has been passed a gush of accumulated urine and pus rushes out of the catheter and at once establishes the diagnosis.

Four courses are open for consideration in the treatment of fibrous stricture with pyelonephritis and violent cystitis: The first is nephrectomy; the second is gradual dilatation of the stricture with bougies, combined with repeated washings of the renal pelvis with antiseptic solutions carried up to the kidney by means of a long renal catheter; the third is the performance of a cystotomy, with the idea of relieving the distressing symptoms on the part of the bladder and of allowing the kidney to go on to complete destruction, in the hope that it will atrophy and give rise to no further disturbance; the fourth is making an artificial fistula above the strictured portion of the ureter.

If it is tolerably certain that the kidney has ceased to be actively functionating, as determined by the examination of the separated urines, the methylene blue test, and by cryoscopy, and it is fairly certain that it is not worth saving, the idea of nephrectomy may be entertained. Nephrectomy may sometimes become imperative, as, for instance, when a general infection of the body threatens. Perinephritic abscess sometimes supervenes in these cases of pyonephrosis; and if the symptoms incident to such a complication are marked, as they are quite certain to be, the safest treatment is preliminary incision and evacuation of the pus, and secondary nephrectomy later, when the patient has recuperated from the acute septic condition.

[1] Loc. cit., p. 113.

[2] T. R. Brown. Johns Hopkins Hospital Reports, 1901, vol. x., Nos. 1 and 2, p. 28.

The treatment of pyonephrosis associated with stricture by means of dilatation of the stricture, combined with repeated washings of the renal pelvis with antiseptic solutions, has much to recommend it, and it is especially to be considered in those cases of pyonephrosis which have not yet been of sufficiently long duration to have destroyed a very large portion of the renal parenchyma. The method consists in passing the renal catheter up to the renal pelvis through the stricture, which is at the same time dilated; antiseptic solutions are then allowed to flow through the catheter, and local treatment is thus given every few days. Kelly[1] records a case treated in this way. The patient was a female, aged thirty-one years, with a spiral stricture of the ureter. The stricture was dilated with ease up to 6 millimetres, and the kidney and ureter treated with washings of bichloride of mercury solution in the strength of 1 : 150,000 to 1 : 16,000, and of nitrate of silver solution in the strength of 1 per cent. The infection was cured and the pus disappeared; but in spite of the dilatation of the stricture there still existed a condition of hydroureter, and the accumulated urine above the stricture was 100 cubic centimetres. Kelly thought the hydroureter to be due to loss of elasticity of the ureteral walls. Pawlik[2] had a similar case of stricture, with pyoureter, which he cured after thirty treatments of the same nature as that employed by Kelly. Morris[3] reports another of Kelly's cases in which a stricture and pyoureter were treated in this way without success. The patient had six treatments at intervals of twelve days, but as each treatment was followed by exacerbation of pain and distress, it had to be abandoned; a ureterovaginal fistula was finally made for the relief of the pyonephrosis. It would appear from the report of these cases that the method is sometimes successful in relieving pain and distress, that it sometimes cures the patient, and that it is sometimes not tolerated at all.

It will sometimes happen that the patient will not entertain the thought of nephrectomy. In such a case it is essential to do something to relieve the distressing symptoms on the part of the bladder; but if the kidney is the source of considerable disturbance from the accumulation of purulent urine within it, simple cystotomy will not give much relief except in so far as it relieves the vesical symptoms. With a "silent" kidney, however, cystotomy will at once put the patient in a condition of comparative comfort, and she enjoys life once more. It is possible at the end of many months that the kidney process may come to an end, and the final stage of inspissation and atrophy takes place. It is conceivable under such circumstances that

[1] Operative Gynecology, vol. i. p. 438.
[2] Albarran and Lluria. Comptes Rendus de la Société de Biologie, 1891, vol. iii., No. 24, p. 543, and No. 26, p. 587.
[3] Surgical Diseases of the Kidney and Ureter, vol. ii. p. 439.

the patient might get entirely rid of her infection and recover, in which case the fistula might be closed.

A fistula above the stricture may sometimes have to be made if for any reason nephrectomy or other methods of treatment are impracticable. The indications are distressing focal symptoms on the part of the kidney. The fistula may be made into the vagina, provided the stricture is low enough, or it may be made into the loin if the stricture is a high one. Subsequent nephrectomy should be entertained if this operation is practicable, depending on the decision of the patient and her general condition.

CASE I.—Mrs. C. F. B., aged thirty-five years, was first seen in September, 1898. She was a strong woman, of rather nervous temperament, but under good control. Symptoms had been of two-years' duration. Frequent micturition attended with pain were the first symptoms noticed. The desire to empty the bladder was constant, and urination was necessary every hour, day and night. The general health was excellent. On examination some sensitiveness was discovered over the course of the left ureter at the pelvic brim, and, vaginally, pressure over the same ureter was sensitive. On cystoscopic examination the urethra and whole bladder were generally injected, especially the left hemisphere, and particularly about the left ureteral orifice. The left ureteral eminence was covered and apparently obliterated by cicatricial tissue; its orifice was not seen, and the ureter was not catheterized at this examination. Around the left eminence were many small, superficial ulcerated areas, about one centimetre in diameter, which bled easily on being touched with a probe. At a subsequent examination the left ureter was entered, and a tight stricture discovered about six centimetres from the ureteral orifice. Immediately on passing the stricture there flowed from the catheter eighteen cubic centimetres of purulent urine, thus proving a condition of dilated ureter with retention. The right ureteral urine was not remarkable, and showed a urea percentage of 1.77 per cent. The left ureteral urine showed a urea percentage of 0.63 per cent. It was of a pale, turbid color, containing a trace of albumin; and the sediment, considerable in amount, consisted of pus chiefly, some medium-sized epithelium, a few round cells, and granular detritus; no tubercle bacilli were found. Guinea-pig tests were negative. As the patient refused any serious operation, an artificial vesico-vaginal fistula was made. Immediate relief followed, and she has been comfortable ever since. In this case there was undoubtedly a "silent" kidney which never gave any trouble. At present the patient is perfectly comfortable, and she steadfastly refuses operation of any kind. She has had her fistula nearly five years. Lately an X-ray photograph was taken, with a negative result as regards stone.

CASE II.—Miss T., aged twenty-two years, was seen in January, 1897. Six years previously she had a fall from a hammock, and from that time her symptoms began. When first seen she was in poor general condition. She had lost a good deal of flesh, was very anæmic, and was very nervous and irritable. She had never had any pain in either lumbar region, and there had never been any symptoms on the part of the kidneys to attract attention to them. The usual symptoms

of cystitis were present in a marked degree, and constituted the principal source of suffering. On examination there was some resistance of the muscles over the right kidney, and vaginally the right ureter was larger than normal, and could be felt as a hard cord. The bladder showed the usual appearances of violent cystitis, including ulceration of the right ureteral orifice, which was entirely destroyed.

On catheterizing the right ureter a tight stricture was discovered a short distance from the bladder. The left ureteral urine was normal, but the right ureteral urine contained a large amount of pus, casts of the hyaline and granular variety, and different sized cells. The urea percentage was 0.63 per cent., while on the left it was 2.4 per cent. Guinea-pigs were inoculated, but the result was negative. In February, 1897, a lumbar incision was made and the kidney removed. It was entirely destroyed, with the exception of the capsule and a small amount of tissue underneath it. The ureter was much enlarged and thickened, and admitted the little finger with ease. The operation was entirely successful, and the symptoms rapidly disappeared shortly after it was performed. She was last heard from in June, 1899. She was then well and about to be married. There were no vesical symptoms.

Calculus in the Ureter. Complete obstruction due to calculus in the ureter has been, in the majority of cases, preceded by symptoms and signs pointing to calculus of the kidney. The effect of aseptic permanent closure of the ureter by this means is atrophy of the kidney within a few months, the organ becoming reduced to mere fibrous tissue. In the autopsy records of the Boston City Hospital is the report of a case in which a calculus was lodged in one of the two ureters leading from the same kidney. The portion of the kidney drained by this ureter was atrophied, while the other portion, which was the lower, was perfectly normal. Ralfe and Godlee[1] have recorded a remarkable case in which a calculus was present in either ureter simultaneously. Anuria followed, and an operation upon the right ureter discovered the stone impacted two inches below the pelvis of the kidney. The left ureter was then explored, but the stone was not found; it was passed later. If infection has been present in the pelvis of the kidney before the stone has descended into the ureter, or if it has taken place subsequently, pyelonephritis follows in the kidney. Pyonephrosis is the final ending, the kidney being reduced to a thick-walled cyst containing much or little pus. In some instances of ureteral calculus the periureteral tissue is inflamed, and abscess may occur, resulting in fistula, which may open into the loin. In the autopsy records of the Boston City Hospital is the report of a case which presents unusual features. The patient during life suffered from obscure abdominal symptoms referred to the region of the left kidney. Death resulted from general peritonitis, and at the autopsy the left kidney was found

[1] Clinical Society's Transactions, London, 1889, p. 155.

lying beneath a ruptured abscess cavity which had no connection with the kidney or its capsule. In the ureter were found two stones, one lying impacted 13 centimetres below the renal pelvis, and another a short distance below this; the ureter was not completely obstructed. Behind the ureter, and on a plane with the first stone, was a small abscess cavity, 3 x 2½ centimetres in dimension, in which there was a third stone; this cavity was in direct communication with the large abscess cavity directly in front of the kidney. What probably happened was gradual necrosis and solution of the ureteral wall, occasioned by the pressure of the first stone, which was the oldest one; then secondary abscess in the periureteral tissue; and, later, extension of the abscess to the region in front of the kidney.

The ureter itself may become thinned by pressure, or it may be greatly thickened and dilated. Below the calculus the ureter may become converted into an impervious cord. Changes in the bladder are those due to cystitis.

The symptoms of the affection are frequently obscure as regards location of the calculus. If high up calculus in the ureter cannot be diagnosed from calculus in the kidney, as the symptoms are identical in each. Sudden impaction is evidenced by severe renal colic and possibly hæmaturia. After the first attack of renal colic the pain gradually subsides, and then come on the symptoms of pyonephrosis. The course now varies according as the infection is virulent. If it is virulent, focal symptoms point to the affected kidney; or, on the other hand, with a mild affection the patient may relapse into a condition of toleration. The stone remains embedded in the ureter, and gradual disorganization of the kidney takes place. Some discomfort and uneasiness may be experienced on the affected side, with occasional pain in the lumbar region. Sometimes a tumor below the ribs may be felt by the patient. The cystoscope may show changes in the vicinity of the orifice of the affected side, especially if there has been preceding cystitis.

The urine in complete obstruction will not flow on the affected side, and this constitutes an important diagnostic sign. Periodical discharges of pus point to intermittent complete closure.

The diagnosis is made by a careful survey of the previous history of the case. Previous attacks of hæmaturia are of great diagnostic value, as are also attacks of colic. The X-ray should always be used to determine the seat of the stone; it will not always be successful in locating it. If an exploratory incision is made into the kidney the diagnosis of ureteral obstruction may be made by passing a sound into the ureter from above, but the same result is arrived at by ureteral catheterization through the vesical route. If the latter is done the nature of the obstruction cannot, however, be accurately deter-

mined. Vaginal touch will sometimes locate a stone, which may be felt as a hard mass under the examining finger.

The treatment of complete obstruction is surgical. As to the kind of operation selected, this will depend on the condition of the kidney and the length of time that impaction has existed. It is not proposed to discuss the various methods in detail.

TUBERCULAR URETERITIS. The frequency with which tuberculosis affects the ureter may be seen by the following figures: In 3424 autopsies performed at the Boston City Hospital and at the Massachusetts General Hospital during the past ten years tuberculosis of the kidney occurred 64 times, of which cases 24 were of the caseous variety and 40 of the miliary. In the 24 caseous cases the ureter was diseased as well as the kidney; in the remaining cases it was not affected. In 194 cases of nephrectomies which I have collected from various sources, tuberculosis of the ureter was mentioned 27 times as a complication of the renal disease. Probably we may add to this number, allowing for cases not mentioned.

In this form of ureteritis the ureter may be greatly increased in size. Usually the canal remains patent in spite of its tortuosity and in spite of the numerous shreds which descend from the kidney. Sometimes it does become occluded in this way, and when it does dilatation of the canal ensues as well as more rapid destruction of the renal tissue above. This dilatation may sometimes reach an enormous size, and the cavity thus formed may hold many ounces of pus.

The symptoms referable to ureteritis are so masked and overshadowed by those produced by the renal and vesical tuberculosis that they attract little attention. The main symptom, and the one which may excite suspicion, at least, that the ureter has begun to be involved, is colic. This is produced by a shred of tissue which is caught in the ureter as it descends.

On physical examination, if the disease has lasted any length of time, thickening of the ureter will always be found on vaginal examination. This thickening is quite characteristic of the disease. It is readily detected by the finger, and it is felt as a solid cord running toward the pelvic brim. It is very tender to the touch, and pressure on it excites an urgent desire to urinate. Abdominally an enlarged ureter may be felt through the abdominal walls if the patient is thin, but not otherwise. The appearances seen through the cystoscope are characteristic, and are sufficiently marked to allow of a diagnosis being made in the majority of cases. The typical tuberculous ulcers, with their raised edges and excavated appearance, are very apt to be situated near the orifice of either ureter, generally to the inner side, and miliary tubercles may be seen in the vicinity. In a very advanced stage of the disease, when the mucous membrane of the whole bladder

has been sloughed off, there may be cicatrices and corrugations. In such a case the diseased eminence may have disappeared as the result of the ulcerative changes, and there may be some difficulty in finding the ureteral orifice. The urine gives changes such as would be expected in pyelonephritis. There is abundant pyuria, and the amount of albumin is large; casts, renal elements, shreds, and lastly the tubercle bacillus are found. If, however, the tuberculous disease has not gone beyond the limits of the ureter, and has not invaded the kidney, the amount of pus may be very slight; this is a sure indication that the kidney has not been seriously involved, for with a large secreting cavity in the kidney the amount of pyuria on the affected side is always large. The diagnosis is easy. If a hard, thickened ureter is felt vaginally, tuberculosis may be strongly suspected. Additional evidence is furnished by the history of the case, the cystoscopic appearances, and focal symptoms on the part of the kidney. Finding the bacilli confirms the diagnosis.

It will be interesting to give the results of operations which have been performed upon the ureter for tuberculosis. To the 194 cases of tuberculosis which I have examined may be added Bangs'[1] list of nephrectomies, to the number of 135, and Facklam's[2] list, to the number of 86, making a total of 415 nephrectomies. Among these cases total nephro-ureterectomy was done 16 times, with but 1 death. The results were most excellent. Of the 16 cases 3 have survived two years or more and 1 of them four and a half years, and all the rest were doing well at the time of the report except one, which was improved only. The case which has survived four and a half years is one which occurred in my own practice. The patient was a girl of twenty, and nephro-ureterectomy was done in two sittings, and the tuberculous bladder cauterized throughout on two occasions under ether. She is perfectly well to-day, and does not exhibit a sign or symptom of tuberculosis. Of the partial resections of the ureter with nephrectomy there were 10, with no mortality; 1 of these died later; 3 were improved; in 3 the duration was not given, but they were doing well; and in the other 3 the progress was satisfactory. Of the cases among the 415 nephrectomies in which the ureter was known to be diseased, but was abandoned, there were 36. Analyzed, these cases were as follows:

[1] Annals of Surgery, 1898, No. 27, p. 20.

[2] Die Wegen Nierenphthisis Vorgenommenen Nephrotomien, etc. Archiv. für klinische Chirurgie, 1893, vol. xlv. p. 715.

Total number			36
Operative deaths		11	
Operative recoveries		25	
Percentage of operative deaths			30 per ct.
Operative deaths		11	
Pulmonary phthisis	3		
Tuberculosis of opposite kidney	2		
Cause not stated	2		
Uræmia	1		
Exhaustion	1		
Anuria	2		
	11		
Deaths later		7	
(One year or under	6)		
Tubercular meningitis	1		
Tuberculosis of opposite kidney	2		
Pulmonary phthisis	2		
Cause not stated	1		
(Seven years	1)		
Tuberculosis of opposite kidney	1		
	7		
Improved (duration, a few months to five years; persistent pyuria complained of in all)		5	
Recoveries		13	
Duration not given	5		
One year or under	2		
Two years	3		
Four years	3		
	13	36	

We note that complete recovery may take place even if the ureter has been abandoned. On the other hand the mortality is quite large (50 per cent.), the deaths being either immediate (30 per cent.) or remote (20 per cent.). The cause of death in almost all the cases was tuberculosis in some form, suggesting, at least, that the tuberculosis of the ureter might have been the infecting centre. In one case such a result took place after a lapse of seven years. Among the ill results of abandoning the ureter are fistulæ, secondary abscess if the ureteral stump is buried, continuance and persistence of the pyuria. McCosh[1] reports the case of a man nephrectomized three years previously in whom a secondary abscess developed at the site of the ureteral stump. In another of his cases a secondary ureterectomy was required after nephrectomy, the ureter having become enlarged by a collection of pus within it. It is known, however, that a tuberculous ureter will sometimes atrophy. Brown[2] relates a case of a boy nephrectomized in whom the diseased ureter atrophied to a great extent; but the boy died seven months later of tuberculous meningitis, and at the autopsy tubercle bacilli were found in the ureter which had been abandoned.

To sum up, it appears that if the ureter is abandoned further complications may be expected, and the most to be dreaded is tuberculosis in some other part of the body. The excellent results obtained by

[1] Annals of Surgery, 1899, vol. xxix. p. 757. [2] Ibid., p. 755.

total and partial ureterectomy encourage the belief that it will be more commonly done in the future. It seems proper to insist that total nephro-ureterectomy should be done in all cases in which the condition of the patient warrants it. The added risk of the operation is very slight if the general condition is even fair.

There are some cases of ascending infection in which the ureter becomes progressively larger from below upward. In such cases the extension to the kidney is by actual growth of the disease along the course of the ureteral wall. The separated urines may show only a slight degree of pyuria on the affected side, but the diagnosis is easily made by the thickened ureter vaginally, the vesical appearances, and by finding the bacilli. The treatment of the case will depend on the extent of the ureter involved. If a small portion only is diseased it may be possible to divert the ureter into the summit of the bladder and excise the lower portion, including the ureteral eminence and possibly a portion of the bladder, depending on the extent of the disease.

GONORRHŒAL VULVOVAGINITIS IN CHILDREN.

By Richard F. Woods, A.M., M.D.,
of Philadelphia.

The severe results of vulvovaginitis in the young are of sufficient importance to warrant a more careful study of the character and mode of infection of this disease. I think it is practically certain from looking over the different series of cases reported, and from a careful study of my own, that most of these cases of vulvovaginitis are gonorrhœal in nature. I think, moreover, it is equally certain from these same collected cases that this disease in children is of much greater danger than is commonly supposed, and that the results are sometimes appalling. That the greatest care and thoughtfulness should be exercised with a vaginal discharge in children, both in regard to the local treatment, the care of the eyes, and infection to others, I am sure all who have had these cases to deal with will agree. The medico-legal aspect of the case also makes it of great importance. The knowledge which we have of the superstitious belief among the poorer classes, especially among the negroes, that connection or attempted rape with a virgin will cure the gonorrhœa in a male, made many, before the fact of the facility of contagion from other sources was known, jump at the conclusion of rape, and even now there is no more delicate or difficult medico-legal problem with which physicians are called on to deal.

The publications of Pott, von Duche, and Spaeth, which first placed the so-called vulvovaginitis of infants among the gonorrhœal affections, have been followed by reports of many cases, the large majority of which are gonorrhœal. In 1885 Fränkel in 62 cases which he examined with the microscope found diplococci which resembled in appearance the gonococcus of Neisser. Cseri also in 26 cases which he reported discovered a diplococci, which led him to think that all his cases were gonorrhœal in origin, although his cultures and inoculations were practically negative. Morse reports 21 cases, in 16 of which he was able to demonstrate the gonococci to his own satisfaction; and Cohenbrach found the gonococci in 20 out of 21 of his cases. Suchard reports 12 cases due to infection by towels, all of which he believes were gonorrhœal; while Weil believes that he traced 30 of his cases to infection from a rectal thermometer.

Skutsch's article is very interesting as showing how easily the infection may travel. He reports 160 cases of vulvovaginitis contracted by using the free baths at Posen. All the children had most of the symptoms of gonorrhœa, intense pain on urination, and in some of the cases there were marked constitutional symptoms. The bathing water was not changed frequently, and several children bathed together in the same tub. Dr. Steinschneider examined the discharge from 140 cases, and in 60 of them found gonococci. He came to the conclusion that all of the cases were gonorrhœal in origin.

In a large number of cases that Pott reported he considered that the origin of most of them was gonorrhœal; 1 in 8 of his cases had congenital syphilis, while only 3 in 86 cases followed attempts at rape.

O'Donavan makes the statement that in vulvovaginitis among negro children the slide invariably shows gonococci. Williams found the gonococci of Neisser in 4 out of 5 cases that he reports. Atkinson discovered 6 cases, all sleeping in the same dormitory, in an institution. Close questioning of some of the larger girls revealed the fact that they had been titillating the genitals of the smaller girls. In a year the institution was pervaded by a contagious ophthalmia. He comes to the conclusion that the vulvitis was caused by the ophthalmia, and not *vice versa*. Martin inoculated the pus from an infant, suffering from vulvovaginitis, into the urethra of a man; a severe gonorrhœal urethritis followed.

With such an array of testimony it would seem certain that the great majority of all cases of vulvovaginitis in children are of gonorrhœal origin. We must remember, however, that the mere finding of diplococci in the vaginal discharge is by no means positive. There is a great variety of diplococci in the vaginal secretion, as Bumm has shown; and while there is very little doubt, from the symptoms and

microscopic findings, of the gonorrhœal origin of most of the reported cases, still the doubt does remain until the gonococci in each case have been cultivated and inoculated.

In regard to the other causes of this disease, the following classification is, I think, sufficient:

Catarrhal.
  Filth.
  Exanthemata.
Traumatic.
  Rape.
  Masturbation.
  Mechanical injury.
Infectious.
  Oxyurides.
  Bacteria, pathogenic.

Atkinson lays down ulcerative stomatitis as a cause. Sheffield thinks that masturbation is a result more than a cause.

I can find very few cases where there was a coexistence of the oxyuris vermicularis, and none in which they have been definitely proven to have been the original cause. There is no doubt that they sometimes are the exciting cause, just as a scrofulous diathesis, filth, etc., may start the disease; but they are certainly rare compared to the gonorrhœal origin.

Gonorrhœal vulvovaginitis apparently can be contracted from towels, bathing vessels, sheets of the bed, etc., as has been shown from the cases above reported, the unprotected and prominent vulva in children seeming to be an easily accessible position for the inroads of the gonococci. Currier believes that an infant may be infected by its mother during parturition. This, I think, has occurred in the second case I report. Matin reports that a girl, aged six years, who contracted gonorrhœal ophthalmia from her older sister—with whom she slept and who was suffering from a vulvovaginitis—by sliding down on the sheets and getting the eye infected in this manner.

The microscope is the only means of telling the infectious from the non-infectious, and it is a good rule, as Williams suggests, to consider all cases infectious.

The symptoms seldom vary, and are generally typical. The vulva is bathed in a yellowish or whitish, thick discharge, which on pressure seems to exude from the vagina. The vulva and vagina in advanced cases are swollen, red, and painful on pressure. There is a slight rise in temperature, and constitutional symptoms sometimes are marked. Painful urination is not a constant symptom, although I think that the urethra is involved in infantile vulvovaginitis as often perhaps as in

gonorrhœa of the older women. In my Cases II. and IV. there was painful urination, although in Case II. it was rather uncertain. In Sheffield's table, out of 65 cases 13 presented severe symptoms of ardor urinæ. Cystitis is perhaps a rare symptom, although Cohenbrach, Comby, and Reblaud report it as a complication in some of their patients. Ophthalmia is the most common of all the complications. In Leszynsky's report, 18 children out of 35 contracted purulent ophthalmia. It occurred in none of my cases. Heart lesions are sometimes found accompanying vulvovaginitis, and arthritis, according to Storer, is quite common in the gonorrhœal form of this disease.

Hartly tells us of a patient of his—a girl, aged five years, suffering from a purulent vulvovaginitis—whose ankle became much swollen and presented all the appearances of gonorrhœal rheumatism. He also reports four other cases of rheumatism in children suffering from vulvovaginitis, and in one of these cases gonococci were found in the fluid from the joint.

The most severe and dangerous complication of infantile vulvovaginitis, however, is acute peritonitis, caused by the ascent of the infection up the uterus and tubes into the peritoneal cavity. Many cases of this kind have been reported. Stevens reports a case of a child, aged four years, suffering from a vaginal discharge, developing all the symptoms of acute peritonitis. The child soon went into collapse, and died. The leucorrhœal discharge he found by questioning to have been present for some time. Huber describes the case of a girl, aged seven years, who was suffering from a vaginal discharge; no microscopic examination was made. She developed symptoms of peritonitis. The diagnosis of ruptured appendix was made, but the operation revealed a normal appendix. There was general peritonitis, and the right tube was very much thickened and inflamed, evidently the channel by means of which the infection had travelled. He also saw a girl, aged eleven years, with an exquisitely tender and enlarged ovary and tube, who was suffering from a vaginal discharge. Sänger gives an instance of a girl, aged three years, who had peritonitis in consequence of gonorrhœal vulvovaginitis. Caille has seen a case, in an infant, aged five months, whose father was suffering from gonorrhœa. The child, who had ophthalmia and vulvovaginitis, finally developed peritonitis and died. There is very little question that in all these cases peritonitis was caused by the infection starting from the vulvovaginitis. Max found pus in the Fallopian tubes of children three times at autopsies. Sänger is perhaps right when he states that the cases of unexplained pelvic disease in virgins can be referred back to an infantile salpingitis that remained quiescent until puberty —an infantile salpingitis that owed its origin to a vulvovaginitis.

Sterility is in some women due to the same cause; and I think we will all agree with Currier when he says "it seems probable that many of the deformed and underdeveloped uteri with which are associated so much dysmenorrhœa, etc., are the consequence of infantile vulvovaginitis."

With all these complications and insidious sequelæ, how frightful the disease becomes. It is not merely a mild secretion which is caused by a cold or slight inflammation, and warranted to recover in a few days or weeks; it is a disease which bears grave and serious dangers, and should not be passed over lightly, but should be watched with the most faithful vigilance and precaution, and fought, step by step, until it is entirely eradicated and no doubt remains as to a complete cure.

In regard to treatment, I found the following very satisfactory in my cases: Cleanliness was enforced and proper hygiene attempted. The children were given small doses of quinine or syrup of the iodide of iron, three times daily. Strict attention was also paid to the bowels. Potassium permanganate was used in all the cases. A solution of 1:1200 to start with was used slowly through a rubber catheter; this was gradually increased until a strength of 1:2000 was reached. The douches were given twice daily, the genitals being thoroughly cleansed with soap and water before each treatment, and powdered boric acid was introduced into the vulva and blown into the vagina with a powder-blower after each douche.

Currier uses nitrate of silver, 2 per cent., in gonorrhœal forms. Storer advises that the infant of a gonorrhœal mother should have the genitals protected as well as its eyes, and should not be allowed to sleep with its mother. He thinks the greatest care should be taken to prevent ophthalmia, even to confining the hands; and the eyes, besides being washed with soap, should be washed in a bichloride of mercury solution every morning, as they are more liable to become affected during the night. Sheffield believes that the only preventive for ophthalmia is binding the eyes at night, and that nitrate of silver, 10 grains to the ounce, is an excellent abortive in the early stage of lacrymation. Pott advises bougies of iodoform; Pozzi, insufflation of iodoform; while Marfau uses bougies of alumnol, 2 per cent.

The histories of my own cases are as follows:

Case I.—M. F., aged three years. Three months ago her mother noticed a profuse discharge, which had caused a great deal of irritation and discomfort. The child's undergarments were constantly soiled and stained. Examination revealed the labia reddened and swollen, bathed in a white, thick discharge. There were no symptoms of infection of the urethra.

Case II.—H. C., aged three months. The child has a vulvovaginal discharge, which has been present since birth. The mother thinks that

urination gives the child some pain, as she cries when she performs the act. Vagina exudes a thick, yellowish discharge, which bathes the vulva. The mother was examined and found to have a vaginal discharge and some slight urethral discharge. The discharge of the mother was examined for gonococci, but none could be found. She admits that her husband suffered from gonorrhœa some time before her child was born, but is uncertain in regard to the date; moreover, she states that her labor was a very difficult one, and she thinks "that the child was born feet foremost." I think it is probable that it was a breech presentation, and that the child was infected at birth.

Case III.—A. W., aged eight years; has had a vulvar discharge for two weeks. Her symptoms and the examination were similar to the other cases.

Case IV.—M. W., aged ten years; is a sister of Case III. She has had a vulvovaginal discharge for three weeks. She has always slept with her younger sister. Both these children were brought to see me by the mother, who thought rape had been attempted. She thinks that her son, who is eighteen years of age, has gonorrhœa, but of this she is not positive. I think the elder girl was infected either by a utensil or a cloth of some kind, and in turn infected her sister, with whom she slept.

Case V.—F. H., aged four years; has suffered from vulvar discharge for three weeks; some pain on urination. The mother says that two weeks ago the child had inflamed eyes; when she presented the child for examination, however, there was no evidence of ophthalmia.

I will now state the results obtained from the cultures and the microscopic examination of these cases.

The test of the gonococci in the cultures is their growth on a medium of hydrocele fluid and agar and their refusal to grow on plain agar. This procedure was attempted in every case except one. How successful was the result the following will show:

In Case I. the discharge was stained with gentian violet. Diplococci were present, which were decolorized by Gram's solution. Cultures were attempted in agar and hydrocele fluid and a growth obtained. This was examined and found to contain diplococci, which were decolorized by Gram's method. A growth was obtained on agar, however, which makes the diagnosis uncertain. I still believe the gonococci to have been present mixed with some other organism, which developed on the plain agar.

In Case II. diplococci were found which were not typical. No growth was obtained on hydrocele agar. This case I consider negative.

In Cases III. and IV. the result was absolutely positive. Gonococci were found, which were decolorized by Gram's solution, and typical cultures were obtained on hydrocele agar, but no growths took place on plain agar. I consider both these cases to be gonorrhœal.

In Case V. examination of the discharge showed diplococci in the

cells, and they were decolorized by Gram's method. This patient was to return for a culture, but, unfortunately, disappointed us and remained away. Although the cultures were not obtained, I consider the case to be gonorrhœal in nature.

In consideration of the difficulty in growing gonococci and the liability of a mixed infection, I think the probability is that all the cases I report were suffering from gonorrhœal vulvovaginitis; however, the results obtained in the laboratory are the only positive ones, and show that out of five cases two were proven to have gonorrhœal vulvovaginitis, one was uncertain, one was negative, and in the other no culture was made.

I wish to express my thanks to Dr. Longcope, of the Ayer Laboratory of the Pennsylvania Hospital, for his kind assistance to me in my investigations.

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MEMOIR OF J. M. DA COSTA, M.D.

By Mary A. Clarke.[1]

Jacob Mendes Da Costa was born on the Island of St. Thomas, West Indies, on February 7, 1833. His father was John Mendes Da Costa, who lived at leisure as a gentleman of wealth in the West Indies, where his ancestors had been bankers and planters. His mother was a woman of great force and beauty of character. She was wise with a knowledge of the world, but had the simplicity and charm of a pure, tender-hearted, affectionate woman. The Da Costa family was an ancient one, of Spanish and Portuguese extraction. In the sixteenth century some of its members passed over into Holland, others settled in England, and through the English branch the subject of this sketch traced his descent.

The parents of Dr. Da Costa removed from the Island of St. Thomas when he was about four years of age. He remembered vividly a great conflagration that occurred shortly before this event, and could recall the ship on which they departed. For many years they resided in Europe, where careful attention was paid to the education of the children, largely by private instruction. Dr. Da Costa and his brother Charles were for three years at a gymnasium in Dresden, preparing for the University, and living under the care of old friends of their parents. On returning home, in 1849, a letter from these friends accompanied them, and an extract from this forms a pleasing picture of the two promising youths.

"Both return as you intrusted them to our care. Their hearts are as innocent and sincere as when they came to us. You will find their talents developed, their characters confirmed, their minds aspiring to everything that is good, right, true, and noble; their manners gentle and pleasing. Both are healthy and strong. As long as we shall live they will remain dear in our remembrance."

As a gymnasium student Dr. Da Costa devoted his time chiefly to the study of the classics and the modern languages, in which he became proficient, not only speaking French and German with perfect purity and great fluency, but acquiring, later, a reading knowledge of Spanish, Portuguese, Italian, and Dutch, while in the classics he was so thoroughly grounded that they remained always a source of delight. While in Dresden he worked very hard, and had no time to engage in sports such as are now in vogue among students. Except for lessons in fencing, dancing, and music, he knew little of recreation. During his

[1] For many years the private secretary of the late Dr. Da Costa.

youth financial reverses fell on the family, and on reaching manhood he had his way to make as many other young men.

Dr. Da Costa maintained, in after life, that he had no special talent for medicine. He thought that a man who succeeded in one career would have succeeded equally well in any other, hard work being the main factor, with something due to natural bent and favoring circumstances. In youth his tastes inclined him to politics or diplomacy; but friends dissuaded him, and he turned to the study of medicine, entering the Jefferson Medical College of Philadelphia in 1849, and graduating there in 1852, at the early age of nineteen years, his thesis being "Epithelial Tumors and Cancers of the Neck." In September, 1853, at the instance of Doctor, now Monsignor, Doane, he was made a Master of Arts of Burlington College, New Jersey.

After graduating in medicine Dr. Da Costa spent eighteen months in Paris and Vienna, pursuing chiefly the study of pathology and of internal medicine. While in Paris he lived in the Quartier Latin. He worked exceptionally hard, seizing the advantages offered by attendance at the various hospitals—l'Hôtel Dieu, la Charité, l'Hôpital des Cliniques, la Salpêtrière, Lourcine, and l'Hôpital du Midi. His favorite professors were Trousseau, Orfila, Nélaton, and Ricord. Early every morning he frequented the hospitals, attended private courses of all kinds during the day, and thus obtained special instruction from the internes and the young professors agrégés. He learned bandaging from the well-known and marvellously skilful "Père" Ribail, and also found time to take instruction in water-color painting.

His admirable knowledge of the language enabled him to make a far better use of his opportunities than was usual with American students. He enjoyed the drama, and eagerly sought by such means to enrich his store of choice and idiomatic French; and while acquiring the language he gained also an insight into the habits and customs of old Paris. In later life he loved to revisit the old book-stores on the quays, the restaurants, and even the same shops he had frequented when a student there.

In Vienna he was associated with August Klaatsch, the German physician and writer; and here he became the pupil and, indeed, the friend of Hyrtl, who presented to him a collection of microscopic specimens prepared by his own hands. These were subsequently given by Dr. Da Costa to the Biological Department of Columbia University, which had been endowed by his brother, the late Charles M. Da Costa.

In 1853 Dr. Da Costa returned to Philadelphia. He was soon appointed one of the physicians to the Dispensary attached to the Moyamensing House of Industry. He opened an office at No. 212 South Eleventh Street. Here he at once began the practice of medicine, and the instruction of students in physical diagnosis. These practical

classes in diagnosis were composed of ten or twelve young men—students and often graduates of medicine—and were exceedingly popular. There were three or four classes each year, and they were always filled in advance. Dr. Da Costa continued this mode of teaching until he became a lecturer on clinical medicine at the Jefferson Medical College. From such beginnings his practice grew slowly, but surely. It is true he passed through the usual dreary time awaiting its arrival, and he admitted having spent, like many another young doctor, a whole summer in the office of an absent physician, with little but thanks for the time and labor.

He early made investigations into the nature of yellow fever which called forth expressions of appreciation from René La Roche, at that time recognized as an authority in all pertaining to the disease. In 1854 he edited Kölliker's *Manual of Human Histology*, which had been translated by George Busk and Thomas Huxley. His paper, "Researches into the Nature of Typhus," was considered particularly valuable, and the young physician became known as a clear and brilliant writer as well as an original investigator.

In 1860 his class on diseases of the thoracic viscera passed a resolution of thanks, declaring they had ever found him "a courteous and accomplished gentleman; a zealous and skilful teacher; an eloquent lecturer, eminently accurate in all the attainments which mark the scientific physician."

When the *Medical Diagnosis* appeared, in 1864, it claimed the admiration of the medical world. It was the forerunner of other works of its kind, but has held its place during thirty-eight years. New works have appeared, some modelled on its lines, but none has rivalled it in scope, in teaching power, or in its matchless grace of composition. Competent critics have pronounced it to be the most elaborate work on diagnosis in the English language. Even in the library of the irregular practitioner it has an exalted place. As was stated by a journal of the day, in 1871, "Dr. Da Costa's *Diagnosis* will forever remain a monument to his ability, even though future labors were wanting to ornament and rear higher the shaft."

The book passed through successive editions, always in demand and always meeting the wants of the profession. The original plan was strictly adhered to, but new matter was constantly added, while the obsolete or that which had become untrustworthy was eliminated. The ninth edition was issued to the world just as its author was called away from this life. It had been delayed by the great fire that destroyed the building of the publishing company, and with it all the copies of the just printed book. Fortunately the advance sheets used for indexing had been preserved, and from these the reprinting went speedily forward. A proposition to condense the work and make it

conform to the limits of a text-book had been rejected, the writer preferring, when there should be no longer a demand for the work on its present lines, to let it go out of print entirely. The *Diagnosis* has been translated into German, Russian, and Italian, the German translation, issued in Berlin, having reached several editions, while French, Spanish, and Hungarian translations have been projected.

Dr. Da Costa became Visiting Physician to the Pennsylvania Hospital in 1865, and this association continued for thirty-five years. His love for the institution was a part of his life, and his character and labors added to its renown. With the lapse of years, honors and duties, one by one, were resigned, but to this he clung with never-failing affection and zeal. In 1897, at the opening of the Garrett Memorial building, in its splendid operating amphitheatre he delivered an address in which he reviewed the history of the beneficent institution and foreshadowed its perfection in the future.

At the close of the Spanish War the hospital became crowded with the soldiers brought from Porto Rico and the camps, and a call was made upon the staff for extra services. Dr. Da Costa came at once to the hot city and bore his part, personally examining forty or more typhoid cases daily. His treatment of these fever-stricken soldiers was attended with wonderfully good results, and he embodied his experience and observations in several papers, which he soon after published.[1]

In March, 1866, Dr. Da Costa became a lecturer on clinical medicine at the Jefferson Medical College, and in October, 1872, was elected Professor of the Theory and Practice of Medicine, succeeding to the Chair made vacant by the death of Professor Dickson. Here the most important work of his life was done, and his name must ever be inseparably connected with that of the institution. His fame as teacher, lecturer, and author travelled to distant countries and attracted pupils from everywhere to study under his guidance. Among his colleagues were the elder Gross and Pancoast, and near and far, in the great cities of the country and in remote hamlets, these three are spoken of by men who studied under them as "the great trio." In March, 1884, Jefferson conferred upon him the degree of Doctor of Laws.

The resignation of his professorship, in the spring of 1891, came as a surprise to many, and occasioned profound regret to his colleagues, and, in fact, to the whole profession. It was almost immediately after the delivery of a touching and powerful valedictory, which only one colleague knew was his farewell. The college, as soon as his resigna-

[1] Cases of Typhoid Cholecystitis Ending in Recovery, 1899; Phlegmasia Dolens in Typhoid Fever, Especially as Observed among Soldiers, 1899; Anomalous Eruptions in Typhoid Fever, 1899.

tion had been accepted, elected him Emeritus Professor, which position he held until his death.

As a teacher he felt that he had met with his greatest success in life. It has been stated that his public clinics were a feature in the medical progress of Philadelphia. Who can forget the magnetism of his teaching, the erect figure and calm face, the musical voice—slow, clear, yet sufficiently loud, and so graduated as to be heard by the entire audience? His style was simple, clear, and concise. The writer overheard one of his students say, at the conclusion of a lecture, "Da Costa always puts the thing in a nutshell." Even members of other professions delighted to be among his hearers, and a lawyer from a distant city admitted that it had been his habit for years to spend three days of every winter in Philadelphia in order to hear Dr. Da Costa lecture; yet, strange to say, few comments have appeared in print about his ability as a lecturer.

As a consultant he was ideal. Quick and keen in diagnosis, he was ever in sympathy with the perplexities and trials of the young practitioners. When he found them following a wrong diagnosis or erring in treatment, he gently admonished them in private, and thus enabled them to retain the confidence of the patient and family. Many doctors came to him in times of doubt or discouragement. From Maine to Oregon came letters and patients from the pupils who held him in affectionate remembrance.

Strange tales are told of his skill in diagnosis—one, often repeated, of a man being brought into the reception room of the hospital, where Dr. Da Costa, earnestly regarding him, declared him to be suffering from an abscess of the liver; looking again, still more earnestly, he pronounced him to have three abscesses, which proved to be the case.

During all these years he was writing, pamphlets and essays appearing in rapid succession—among them his paper "On Irritable Heart," which led to the general adoption of the name for this disorder; it was published in the *Medical Memoirs of the United States Sanitary Commission*, translated into German by Seitz, and issued in Berlin as a separate publication. Another was his Toner Lecture on "Strain and Overaction of the Heart," delivered before the Smithsonian Institution, in Washington, in 1874. Both were elaborate papers which presented a new view of the whole subject of diseases of the heart.

His work on *Inhalations* appeared in 1867. In 1878 he published *Harvey and His Discovery*, regarded by himself as his best production, but which failed to elicit general appreciation; this was republished, with notes, in a second edition. *Starvation Fever*, in 1880; *The Fluorides in Medicine* and *Nervous Symptoms in Lithæmia*, in 1881; *Pathology of Tubercle*, in 1882, and *Cocaine in Hay Fever*, in 1885, quickly followed.

"The Higher Professional Life," a valedictory delivered in 1883, is one of his most graceful compositions.

Two important essays were the Middleton-Goldsmith lecture, "Relation of the Diseases of the Kidneys, especially the Bright's Diseases, to Diseases of the Heart," delivered in 1888 before the New York Pathological Society; and, in 1893, "The Albuminuria and the Bright's Disease of Uric Acid and of Oxaluria"—a previously but little appreciated form of disease, which, in consequence, is now called by the name of "Morbus Da Costae." His lectures on "Cerebral Rheumatism," on "Valvular Diseases of the Heart," on "Malarial Paralysis," and that on "Lithæmia," delivered before the University of Pennsylvania in 1894, as well as his later papers—"Cardiac Asthenia," in 1894; "The Significance of Jaundice in Typhoid Fever," in 1898; "The Coexistence of Malaria and Typhoid"—have all given a deeper insight into these diseases, their causes, nature, and cure.

Among his most finished addresses—one teeming with noble thought and indicating profound research—was "The Scholar in Medicine," delivered before the Harvard Medical Alumni Association in 1897, at which time Harvard conferred upon him the degree of Doctor of Laws. In referring to Dr. Da Costa's attainments a journal of the day expressed the conviction that "Harvard voiced the universal sentiment of the physicians of America that this is the man whom we delight to honor. His work, teaching, example, and advice have done so much to advance the art and science of medical practice that no honor could be too great an acknowledgment."

Dr. Da Costa's work has been much quoted by other writers. Professor Friedrich examined carefully his essay on "Influence of Respiratory Percussion," verified it, and adopted it. Professor Jaccoud, too, made long extracts in his *Pathology* from the paper on "Researches in Typhus." Fagge, in his *Principles and Practice of Medicine*, refers at length to the paper on "Irritable Heart."

Upon Commencement Day, 1892, Dr. Da Costa received from the University of Pennsylvania the honorary degree of Doctor of Laws; and at the bestowal of the degree, in acknowledgment, he happily responded, "Tibi prefecto insigni, et Universitati celeberrinae, cujus fama, te agendo, ubique per terras augetur, ex imo pectore, gratias do." In February, 1899, he was made a Trustee of the institution. During the last year of his life he was much engaged with the proposed changes in the Medical Department, and he became one of the founders of a retiring fund for professors.

Dr. Da Costa always felt a lively interest in military matters. During the Civil War he was made Acting Assistant Surgeon of the United States Army and assigned to duty at the military hospital at Sixteenth and Filbert Streets, Philadelphia. Here he gathered much of the

material for his paper on "Irritable Heart." In 1892 he became a member of the Military Service Institution of the United States, and read its journals regularly. In 1896 he delivered an address of welcome to the Association of Military Surgeons, then assembled in Philadelphia, which evidenced an intimate knowledge of the changes in modern warfare, and was a beautiful tribute to the gallantry and devotion of the medical men whose names are illustrious in the annals of war.

He always took pride in his connection with the College of Physicians of Philadelphia, one of the oldest and most influential medical societies in America, of which he became a member in 1858, and of which he was twice President, serving from 1884 to 1886, and again from 1895 to 1898. He loved this ancient institution with undiminished affection until the last hour of his life. Its motto, "Non sibi sed toti," as he so fitly said in an address in 1885, encouraged its sons not to rest until they had permanently enriched the science for which they were banded together. He believed, with Rush, that if the College continued as discreet as it should be in the admission of members its fellowship would become in time "not only a sign of ability, but an introduction to business and reputation in physic." On this occasion he expressed the opinion that the College itself was at fault for not being rightly known to the public nor sufficiently appreciated, the College being inclined to keep within itself and to refrain from speaking publicly on the medical questions of the day—questions concerning which its members were best qualified to speak with the voice of authority. He felt that the advantages of membership in this institution were great, and was anxious that its high standards should be maintained, but thought there should be greater liberality as regards admission, and he urged a reduction in the annual fees, claiming that no young man of ability, lacking in means, should, for the want of money, be debarred association with a society conferring such benefits. During his last presidency he made a strong plea for increasing the number of members. He proved by painstaking research that the proportion of members to the number of doctors in the community was greater one hundred years before, as shown exactly by the *City Directory* of 1796, than at the present time.

Between his two terms of office, when it was feared that the epidemic of cholera then prevailing in some parts of Europe might extend to our shores, he was appointed chairman of a committee of the College to devise ways and means of meeting the emergency. Toward the close of his last term an epidemic of typhoid and our infected water supply caused him great anxiety. He wrote to the Mayor, urging filtration as the most speedy remedy, leaving for future discus-

sion the question of a new source in the Delaware water-shed rather than the Schuylkill.

He was much concerned, too, by rumors of the proposed measure to make the competitive hospital appointments of Philadelphia open only to residents of the city. He deprecated this as a step in a backward direction, and thought it would ruin Philadelphia as a medical centre by removing one of the incentives to young men in all parts of the country to come here for their studies.

In the President's address of 1895 he expressed regret that the valuable papers presented at the meetings of the various sections throughout the year could not be fully published, and he suggested ways of arranging for this in the future. That he had the progressive movement much in mind is shown by provisions in his will.

Dr. Da Costa was greatly opposed to the publication of biographical sketches of the living, and invariably refused to give information concerning himself for such projected works. Only after Harvard had conferred upon him, in 1897, the degree of LL.D., and at the urgent request of the editors of the *Harvard Graduates' Magazine*, he furnished them a brief sketch of his life, which has been made use of by other journals.

Tributes to his medical skill had not been wanting. Besides the associations which continued throughout his life he had been Attending Physician to the Protestant Episcopal Hospital and to the Philadelphia Hospital, and Consulting Physician to the Children's Hospital. He had been a member of the American Medical Association and also of the Pathological Society of Philadelphia, of which he was once the President. He had also been President of the Association of American Physicians, an honorary member of the Medical Society of the State of New York, a corresponding member of the Pathological Society of New York, and a member of the Medical Society of London.

After caring for the eminent British surgeon, G. W. Callender, of London, who fell ill while travelling in this country, Dr. Da Costa received very complimentary resolutions of thanks from St. Bartholomew's Hospital.

Social and scientific honors came to him from all sources. In February, 1852, he became a member of the Academy of Natural Sciences of Philadelphia. In 1855 he was made a member of the American Academy of Arts and Sciences of Boston; in October, 1866, of the American Philosophical Society; in 1867, of the New England Historic and Genealogical Society; in 1890, of the Trinity Historical Society. He joined the Contemporary Club in 1888, and was one of the original members of the Mahogany Tree Club, which was organized, in 1889, by the late Dr. William Pepper, and had among its

members the late Hon. Thomas F. Bayard, Dr. S. Weir Mitchell, Daniel C. Gilman, Professors Langley and McMaster, and the late Frank Thomson.

In his brief leisure Dr. Da Costa loved to dispense an easy hospitality, and his beautiful home at 1700 Walnut Street received not only the friends he loved, but occasionally strangers of distinction who brought him letters from his friends abroad. In 1888 he became a member of the famous Wistar Association, inaugurated by Caspar Wistar in 1800, "when Philadelphia bore the palm in literature and society." In this association Dr. Da Costa seemed to transmit the traditions and memory of the founder himself, and formed a connecting link between the leaders of medicine and the representatives of other professions in the city. Like Wistar, he was "an admirer of happy human faces."

The meetings were always held on Saturday night, and it was a custom to invite any eligible sojourners who happened to be in the city. On one of these occasions Emil Pasha, the African explorer, was a guest; on another the late Duke of Buckingham, as was also Sir Henry Stafford Northcote, the present Governor of Bombay. Dr. Da Costa resigned from the Association in 1898, feeling it a duty to make way for a more active member.

For years it had been generally understood that Dr. Da Costa was "at home" to receive any friends on Sunday evenings, and this gave opportunity to many to enjoy his society as well as to meet the cultivated and eminent men of the city—writers of distinction, famous jurists, men of science, artists, and explorers. They entertained each other, and had simple refreshments of wine and cigars.

Another association that gave him unmixed pleasure was that of the Shakespeare Society. He attended the annual dinners, and greatly enjoyed the toasts, with their apt Shakespearean accompaniments. At the last dinner, in April, 1900, an innovation was the taking of a picture of the festive board; but, unfortunately, the only face in the goodly company not distinctly shown by the artist was the one so soon to become only a memory.

Books were his friends. With a wide knowledge of general literature he retained his early love for the classics. His great success as an author was due to his profound knowledge of the best authors. The gathering of his miscellaneous library gave him keen pleasure, and it embraced few books which he had not read. It contained many memoirs of distinguished men, illustrating the best of the times. It was especially rich in the English classics, always in choice editions and appropriately bound. For its size it was probably one of the best selected libraries of English literature ever gotten together.

Dr. Da Costa's admiration of Thackeray was unbounded, and his collection of first editions of this favorite author was an almost com-

plete one, as was also his collection of the writings of Sir Arthur Helps.

He never enjoyed reading a book from a library. He might read one loaned by a friend, but to thoroughly enjoy a book it must be his own. Rarely did a summer pass without his reading over again some of the favorites of his youth, such as the novels of Sir Walter Scott or Cooper, and the works of Kipling and Marryat gave him pleasure. Tales that ended tragically were an abhorrence to him, and to these he infinitely preferred the subtle frivolities of Anthony Hope.

He disliked, in writing, all compound words, as well as interjections, of which he never made use. A purist in language, he loved all that was pure and best in literature. Slang was most repugnant to him. A coarse expression gave him positive pain.

He was abstemious in habit, a small eater, an early riser, given to punctuality. He would not lie on a couch to rest, but rested always in a big chair. During his student days in Paris early rising had become a necessity and fixed habit, which clung to him through life. In the summer of 1898, in the hours before breakfast, he amused himself by translating a Latin ode, "To Sestius," which was published in a university magazine. Even in his latest years much of the literary work he accomplished was performed in these early hours. He had, too, the invaluable habit of utilizing the minutes. Important letters were dictated in the few moments of waiting for his carriage or in the brief intervals between seeing patients.

Dr. Da Costa's personality was charming; his grace of manner such as is rarely seen, and can never be forgotten. His kindness of heart made it impossible for him to cherish resentment. The calls upon him for aid, from people known and unknown to him, were numberless, and it was most difficult for him to turn a deaf ear to these petitions. He believed it unwise to lend money, but thought it better to give outright the help desired. It caused him keen distress to remember that he had been unkind or hasty in speech, or had denied a request that might have been granted; and sometimes, when he had turned strangers away, laborious efforts were afterward made, as the writer well knows, to find them and give the help at first refused. It really grieved him to know that a little colored newsboy, who daily presented papers for sale as he entered his carriage, had been driven away from the corner by an over-zealous policeman.

The familiar little tin sign, loosely placed in the window and simply inscribed "Dr. Da Costa," was the only one he ever had. In the last year of his life this frequently fell out of the window, being returned to the house by small boys, who regarded it as of great value, and who, by Dr. Da Costa's orders, were rewarded for restoring it. Prob-

ably from its falls it had acquired a worn appearance, and Dr. Da Costa remarked, one morning, in April, "The sign has done its work, and the owner, too; we will soon be gone together."

Dr. Da Costa sometimes asserted that he ought not to have been a physician; he felt too much distress at the sufferings he witnessed, and this distress grew upon him with advancing years. In his last address before the Jefferson Medical College he mentions a Nestor in the profession who could neither eat nor sleep when contending with a dangerous malady, and no one can doubt that this statement was true of himself.

His professional manner was quiet and gentle. His attention was never distracted, and the patient and friends were always impressed by the fact that, for the time being, the case absorbed him. Before leaving the sick-room his last words were addressed directly to the patient, and conveyed to him some comforting thought.

Dr. Da Costa was a regular attendant of the Protestant Episcopal Church, and lived the life of a sincere and devout Christian. No pressure of work was allowed to interfere with his daily reading of the Bible, and on Sundays much of his time was passed in its close study, with the aid of the best commentaries to be obtained. The books of Job and Isaiah and the Pauline epistles were his favorite portions. The hymns he loved best were "Lead, Kindly Light," and "Nearer, My God, to Thee," and these, as he had requested, were sung at his funeral.

In 1860 Dr. Da Costa married Miss Sarah Frederica Brinton, daughter of the late George Brinton and sister of Professor John H. Brinton, a colleague and lifelong friend. After a protracted illness Mrs. Da Costa died in 1889, leaving one child, Charles Frederick, now a member of the Philadelphia Bar.

Dr. Da Costa's last address, "Questions of the Day in Medicine," delivered before Yale University at the end of June, 1900, occasioned general comment in this country and in Europe. It was a powerful plea for the amelioration of the condition of the poor consumptive, and reawakened interest in these hapless creatures. He endeavored to prove conclusively that consumption—so familiar to us all, and viewed with stolid fatalism—is more destructive to human life than epidemics of cholera or yellow fever, because more continuous and widespread. He begged that legislation be brought about to provide sanitaria for the cure of the disease, and indicated that in this cause our merchant princes might find an outlet for their most abundant philanthropy.

Dr. Da Costa had never been strong after an attack of influenza in 1890. A severe illness in the autumn of 1894 still further impaired his strength, though he apparently recovered, and was benefited by a

sojourn at Carlsbad in 1895 and again in 1896. During one of these trips to Europe he visited Edinburgh for the first time. Professional men in England and Scotland welcomed him warmly as one of the foremost of American physicians, and on the Continent the same cordial hospitality was shown to him. In Berlin he was entertained by Professor Leyden, the court physician, recently returned from attendance on the late Czar of Russia.

While he had passed many years in Europe, he had never seen Rome, and he greatly desired to go there as well as to visit Greece and Spain. He felt, too, that a warm climate would be beneficial to his health, but the time for giving up his practice never came. On the day of his death he again expressed a wish to see Rome, but added, "I have made no arrangements, and therefore cannot go this year, and next year I shall not be here."

This premonition of death seemed to be with him for several months. In the spring of 1900 he told his secretary that he believed he should not live a year, and thereafter he made the assertion frequently. He felt no fear of death, but hoped he should not suffer much. For three years he had been subject to attacks of pain on taking exercise, and in June, after an attack of unusual severity, with great oppression, he expressed a conviction that the cause was angina pectoris. In the following August, when alone in Boston, he had another violent seizure, but he mentioned it so lightly to those nearest him that none was aware of the serious nature of his malady.

When the end came, with terrible swiftness, at the close of a day of great activity, the blow to all who loved him was of crushing force. He had dreaded a life of invalidism, but this he was mercifully spared. He died at his country-seat at Villanova, Pennsylvania, September 11, 1900.

In closing this short sketch of a beautiful and noble life, no words seem more fitting and appropriate than those breathed by the prophet Micah of old: "He hath showed thee, O man, what is good; and what doth the Lord require of thee, but to do justly, and to love mercy, and to walk humbly with thy God."

REVIEWS.

A TREATISE ON DISEASES OF THE SKIN. For the Use of Advanced Students and Practitioners. By HENRY W. STELWAGON, M.D., Ph.D., Clinical Professor of Dermatology, Jefferson Medical College and Woman's Medical College, Philadelphia; Dermatologist to the Howard and Philadelphia Hospitals. In one octavo volume of 1125 pages, with 220 text illustrations and 26 full-page lithographic and half-tone plates. Philadelphia and London: W. B. Saunders & Co., 1902.

THE avowed purpose of the author in writing this book was to produce a practical treatise upon dermatology which should be useful to the general practitioner as a guide in the recognition and treatment of diseases of the skin as seen in his daily practice, and a careful survey of this imposing volume of more than a thousand pages has convinced us that he has performed his difficult task with more than ordinary success. While the scientific portion of the subject is by no means neglected, etiology and pathology being given due consideration, the more practical matters of diagnosis and treatment are especially emphasized and treated at great length. As being the very alphabet of diagnosis, the primary and secondary lesions of diseases of the skin are described with unusual care. The section upon General Diagnosis seems to us especially worthy of notice as containing many useful hints upon the recognition of cutaneous diseases; it well repays reading. We note that special importance is attributed to the distribution of cutaneous eruptions as affording very valuable aid in diagnosis, a point which is not sufficiently emphasized in many text-books. We also observe that the author is not inclined to attach too much importance to the history of cases as obtained from the patient, believing that it is often misleading; and this is in entire accord with our own experience, which has convinced us that the history as ordinarily given is just as likely to lead away from as toward a correct diagnosis. Indeed, we have long felt that errors will frequently be avoided by relying upon the objective symptoms alone, disregarding the history. In the sections devoted to treatment the numerous remedies useful in the various diseases are not merely enumerated, as is sometimes the case, but a wealth of detail is given as to the manner of employing them—a matter of quite as much importance as the selection of the remedies themselves.

On account of the absence of any entirely satisfactory classification of diseases of the skin, the author was at first inclined to go around the difficulty by adopting the alphabetical arrangement provisionally used by the American Dermatological Association and employed in a number of the more recent text-books, notably those of French authorship; but upon due reflection he concluded that some system of classification, even though imperfect, was desirable for teaching purposes, and adopted the well-known pathologico-anatomical system of Hebra as modified by

more recent authors. This system, although admittedly open to criticism at many points, is, perhaps, in the present state of our knowledge, the most practical yet devised. The ideal scientific system would be one based upon etiology, but the gaps in our knowledge of the causes of disease are yet too many and too wide to make such a system practicable; but it is not too much to hope that the present enormous activity in every department of medical research will, in the near future, make possible a reasonably successful attempt at such a classification.

Eczema is held to be a catarrhal inflammation of the skin, due to a great variety of causes, internal and external. The micro-organisms present are not believed to bear any pathogenetic relation to the primary lesions of the disease. We are glad to notice that the term "parasitic eczema," employed by some authors to designate those forms of the affection characterized by rounded marginate patches, finds no favor. It is considered a "vague term;" we would go further and say that it is quite indefensible, since no special organism has yet been demonstrated in these cases; and without such demonstration the use of the term is without warrant. The term tuberculous as applied to the eczemas occurring about the mouth, eyes, ears, and nose in strumous children is also believed by the author to be used without sufficient foundation. Treatment is considered at length, and the safe middle ground is taken that, for the successful management of this extremely frequent and very important disease, both constitutional and local remedies are necessary. The section upon Constitutional Treatment begins with the statement that this does not mean the employment of drugs alone, but includes the regulation of the diet and all other hygienic measures which conduce to the patient's health, a statement which we commend to the thoughtful consideration of the young practitioner and some old ones as well. It is pointed out that there are no specifics for eczema, and that the internal treatment must be carefully adapted to the individual case. Among many other local remedies, the gelatin preparations, as recommended by Pick, Unna, and others, are considered of great value.

All the forms of impetigo are stated to be contagious, and the several clinical varieties are described under the one title, impetigo contagiosa, the author believing that, while not scientifically exact, this manner of treating the subject is the most practical. The view that the affection is due, in most cases, to ordinary pus cocci is accepted, although it is also stated that other micro-organisms may occasionally give rise to it. We do not believe that future investigation will confirm this view; we believe the disease will be found to be due to a special micro-organism.

In no class of affections is the tremendous advance of our knowledge of the etiology and pathology of cutaneous diseases in the past two decades more apparent than in the tuberculoses of the skin. Picking up the last edition, published twenty years ago, of what was by common consent the best text-book upon diseases of the skin in the English language at that time, we find a half-page given to tuberculosis of the skin. In this treatise no less than forty pages are devoted to this most important subject. The considerable number of eruptions known as scrofulodermata at last here find their proper place after having been treated so long as maladies due to a peculiar indefinable something called struma.

We are glad to see that some account, even though brief, is given in

a supplementary section, of some of the commoner diseases of the mucous membranes adjoining the skin. We have long thought that text-books upon dermatology should include a description of those diseases of the mucous membranes which are associated in a certain proportion of cases with cutaneous eruptions, as well as of those independent affections which are most apt to come under the observation of the dermatologist.

To the specialist in diseases of the skin one of the most valuable features of the book is the abundant references to dermatological literature which appear on every page. These must prove of great value to every worker in this field of medicine, and ought to insure the volume a place in the library of every student of dermatology.

This review would be glaringly incomplete without some reference to the beautiful illustrations which abound throughout the volume. These consist of reproductions of photographs and colored plates. The former are especially deserving of notice, since they are, with but few exceptions, unusually fine, and add much to the value of the treatise as a text-book.

In conclusion, we believe this to be one of the best books upon the subject in the language, a clear, practical exposition of dermatology as it exists to-day. M. B. H.

A Manual of Surgical Treatment. By Watson Cheyne, M.B., F.R.C.S., F.R.S., Professor of Surgery in King's College, London, and F. F. Burghard, M.D., M.S., F.R.C.S., Teacher of Practical Surgery in King's College, London. Vol. VI. Philadelphia and New York: Lea Brothers & Co.

In this the sixth volume of the *Manual of Surgical Treatment*, Cheyne and Burghard discuss the surgery of the tongue and floor of the mouth, the pharynx, the neck, and the œsophagus, and also some of the surgical diseases of the abdomen. It is important to note that they entirely condemn the division of the frænum, so often practised on infants for tongue-tie. They say that in the majority of cases such an operation is unnecessary, because the frænum lengthens as the child advances in years; and besides this, the operation may be followed by a scar, which anchors the tip of the tongue. When it is absolutely necessary to divide it, they make a transverse slit close to the symphysis of the jaw, pull up the tip of the organ, and thus convert the transverse cut into a lozenge-shaped area; and they put two fine catgut stitches between the lateral angles of the lozenge, so as to prevent the formation of a broad granulating surface.

The chapter on Cancer of the Tongue is admirable, and many important facts of which the authors have themselves made a careful study are pointed out. It is an interesting fact that in cancer of the tongue, whereas the lymphatic glands beneath the jaw soon become involved, the lymphatic vessels themselves are not involved to anything like the extent that the lymph tract between the axilla and the breast is involved in cancer of the breast. Large cancer cells travel through the lymphatics from the tongue to the neck without being arrested on the way, and the lymph tract between the tongue and the glands is affected

only in advanced cases. This leads us to the important conclusion that it is not always necessary to remove the structure between the tongue and the glands; in other words, it is not always necessary to cause the wound in the mouth to join that in the neck. In the early stages it is safe to leave this lymphatic tract untouched. Theoretically, it would be best to remove the fat and glands from the anterior triangle, as is done with those from the axilla in cancer of the breast, even when no lymphatic involvement can be detected by palpation. The authors show us, however, that there are certain disadvantages in doing this. The lymphatic area is not well defined and is very extensive; the infection may extend in many different directions; the glands, when enlarged, can be removed only with difficulty; and it is very hard to clear the region of all fat glands when the latter are not definitely enlarged, some glands being almost certain to escape. If, however, the triangles are once opened, an attempt should be made to remove all the glands then; for it will be practically impossible to do it at a secondary operation, because the scar-tissue will so distort the parts and mat the structures together. The authors think it is better to open the triangles only when there is a certain amount of glandular enlargement present, because this enlargement acts as a sort of guide. If no detectable glandular enlargement is present, they simply remove the disease from the mouth, recognizing that the glands will become involved sooner or later, and may be removed as soon as they do become obviously involved.

The section on the Examination of the Stomach Contents is also very thorough. In performing gastrostomy the authors prefer Witzel's operation. In the chapter on Ulcer of the Stomach they say that the indications for surgical treatment in that condition are the following: (1) When the symptoms have lasted long and do not yield to medical treatment, especially when marked anæmia is resulting from repeated hemorrhages; (2) to arrest profuse hemorrhage that threatens life; (3) to relieve pyloric constriction or hour-glass contraction, and thus cure dilated stomach; (4) when perforation occurs; (5) to relieve indefinite symptoms due to adhesions; (6) to treat a subphrenic abscess.

The various operations are described in detail. The authors recognize the value of the Murphy button; but, nevertheless, they would employ it only in cases of great urgency in which the condition of the patient does not warrant the simple suture operation. They do not think favorably of complete gastrectomy, believing that when a cancer involves a large part of the stomach the neighboring glands will be extensively infected, and other structures adhering to the stomach will be involved; and they doubt whether it is wise to attempt this radical procedure.

The authors then proceed to discuss intestinal obstruction, intussusception, appendicitis, hernia, etc. They are somewhat conservative in some of their views upon the surgical treatment of appendicitis as is common among our English confrères. They believe that when an appendicial abscess is operated upon it should be allowed to heal; and after healing is complete, unless the appendix has certainly sloughed off or has been gotten rid of when the abscess was opened, an operation should be performed for its removal. When several attacks of typical relapsing appendicitis have occurred the appendix should certainly be removed. Even in mild cases of relapsing catarrhal appendicitis the appendix should be removed. If the patient has only one mild attack of catarrhal appendicitis the authors do not advocate subsequent

removal; but when the attack has been severe, they do advocate it. Cases of so-called appendicular colic demand operation. In fulminating and perforating cases, operation should be performed at once, without a moment's delay. When there is suppuration the authors believe that there is distinct risk in waiting for an abscess to extend to the anterior abdominal wall; they maintain that the sooner the abscess is opened, the better. In abscess cases they content themselves with opening the abscess; they do not make any attempt to remove the appendix then, while the infection is virulent and acute, rather preferring to remove it later, after healing has occurred. They say, however, that they cannot help regarding operation during an acute attack, when there is no definite reason for believing that pus is present, with a certain amount of hesitation. If a surgeon is called to a case of relapsing appendicitis within a few hours of the onset of an attack the authors advocate operating at once, because at this time the micro-organisms are still within the appendix and have not penetrated the peritoneal cavity, and the operative manipulations need not diffuse septic material through the peritoneum. After twenty-four hours, however, there is inflammation of the surrounding peritoneum and bacteria have begun to go into the peritoneal cavity. If left alone, these are likely to remain limited to the appendix region; but if the adhesions be torn through they may be diffused and cause general peritonitis. If the favorable moment for operation has passed, the authors are inclined to delay, carefully watching the patient while they wait. They believe that a careful and repeated blood count is of great importance in telling when suppuration begins.

This volume is filled with practical articles. The descriptions of conditions is terse and accurate. The directions for treatment are positive and concise. It is not a compilation, but represents the matured views of two surgeons of extensive experience. It is a worthy companion volume to its predecessors. J. C. DA C.

A TREATISE ON THE DISEASES OF THE THROAT AND NOSE AND ASSOCIATED AFFECTIONS OF THE EAR. By CHARLES P. GRAYSON, M.D., Lecturer on and Instructor in Laryngology in the Medical Department, University of Pennsylvania. Octavo, 540 pages, with 129 engravings and 8 colored plates. Philadelphia and New York: Lea Brothers & Co., 1902.

THE author of this work has had such lengthy experience as a teacher on this subject in one of the great medical colleges of this country that it is *prima facie* evidence of his qualifications to write a student's textbook. The book itself bears out this by its intrinsic adaptability to the needs of students. All such works at the present time must be more or less a rehash of previous books. Dr. Grayson's shows much more originality than the average. The author has constantly kept before him the fact that it is for the student that he primarily writes; consequently the description of the appliances needed for work in the nose, throat, and ear is limited to those things which are absolutely necessary, and we are not treated with a long series of "the author's modifications" of various simple instruments, and the same is true in his account of operative procedures.

The very qualities which render the book of value to the student also open it to the only adverse criticism which we find ourselves called upon to make; namely, it has necessitated the elimination by the author of discussions of some of the most interesting but intricate problems of laryngology and otology. Thus, diseases of the accessory sinuses are dismissed with a very few paragraphs. Mycosis of the tonsils is attributed to the lepothrix, no mention being made of the recent studies by Richardson, Kyle, and others, which have proven that this condition is in most instances not due to the leptothrix but a true keratosis. The author deprecates the use of the galvanocautery in most instances.

One statement which will carry comfort to many but conviction to few is that hay fever is a curable disease. It may be curable, but in the opinion of many of the profession and most of its victims the cure is only to be found by repeated sojourns in a suitable climate during the season in which the victim suffers. The author, in justly ironical language, refers to the recent promulgation of the "discovery" of the value by internal administration of a preparation of the plants which usually produce hay fever, for the purpose of its cure.

A most attractive feature of the book is found in the style in which it is written and in its author's well-chosen language. The book cannot be too highly commended for the use of students or of beginners in rhinology and otology. F. R. P.

A Treatise on Massage: Its History, Mode of Application, and Effects. By Douglas Graham, M.D., Member of the American Association for the Advancement of Science; of the American Medical Association; of the Massachusetts Medical Society, etc. Third edition, revised, enlarged, and illustrated. Pp. 462. Philadelphia and London: J. B. Lippincott Company, 1902.

Taschenbuch der Massage für Studirende und Aerzte. Von Dr. Erich Ekgren, an der III. medicinischen Universitätsklinik zu Berlin, S. 90. Berlin: S. Karger, 1903.

A Pocketbook on Massage.

Nearly twenty years ago we read in its first edition the treatise which comes before us for criticism and review. At that time we were impressed by the honesty and frankness of the author in deducing its indications and contraindications based on the results of its application on over fourteen hundred patients. The present is practically a new work in its scope, in its basis, and in its development. Matters are here presented which have come into medical knowledge and literature, but were then undreamed of; for instance, the neuroses. Physiology has made giant strides; so also has chemistry. Anatomical facts have received new interpretations. The author is no longer solitary as a medical practitioner practising massage and asking for its recognition as manual therapeutics, an ethical, logical, even if ill-understood and underestimated branch of general therapeutics. He is in good company, with broad-minded, well-informed physicians who write on, advise, and practice massage. If his language at times is not that of argument, we may assume that its pungency is developed because the non-

academic statement failed to arouse intelligent interest. Even if his treatment of the subject is strongly *ex parte*, can we expect that any other position would command the attention of his readers? When the author stops short of extravagant claims and recognizes the limitations of his method, as he does, we must acknowledge the strength of his argument. We have taken no trouble in reading the book, for in its perusal from militant preface to prosy index we have found profit in every page, amusement in some chapters, and occasionally an arousing of our curiosity. The illustrations are particularly good, especially those which are borrowed to point out how massage should not be performed. As the dedication has grown from one individual of the first to his "old professors" of the third edition, so we trust that the author's audience will be increased in geometrical progression. As a thoroughly readable work, written by one whose extensive research and long practice, tempered by judicial reasoning, entitle him to a hearing from progressive practitioners, we add our hearty commendation.

The little book of Ekgren opens with a preface by Senator, recommending not only massage but the author as its exponent. It can readily be carried in the pocket, although its contents are none too deep or extensive for the head of an average practitioner. So far as it goes it is excellent, and will, we trust, excite a desire on the part of the reader to acquire the information found in more complete works.

R. W. W.

MORPHINISM AND NARCOMANIA FROM OPIUM, COCAINE, ETHER, CHLORAL, CHLOROFORM, AND OTHER NARCOTIC DRUGS; ALSO, THEIR ETIOLOGY, TREATMENT, AND MEDICO-LEGAL RELATIONS. By T. D. CROTHERS, M.D., Superintendent of Walnut Lodge Hospital, Connecticut; Professor of Mental and Nervous Diseases, New York School of Clinical Medicine, etc. 12mo., 351 pages. Philadelphia and London: W. B. Saunders & Co., 1902.

THE author states that the special object of his book is to bring the subject (of drug habits) out from its present empirical stage to higher and more scientific levels, and to encourage further and more exhaustive studies. As a matter of fact, it is rather a popular exposition of drug habits and the methods of treating them. The greatest space is, of course, given to opium and morphine—269 pages out of 344. Dr. Crothers is more pessimistic as to the frequency of morphinism than many authorities, claiming, for example, that 10 per cent. of something over three thousand physicians were victims. If this holds true of all the physicians in the country, a temperance crusade is much needed. The author exaggerates a little in the chapter on Tobacco, at least we who use tobacco think so. To say unconditionally that the use of tobacco is not only dangerous but certain to be followed by debility, mental perversion, and exhaustion is to use very strong language. He also says that oculists describe tobacco amblyopia as very common. The oculists of our acquaintance are of opinion that it is not very common, and, indeed, very rare save in drinkers. Finally, it appears that there is some question as to moral and mental responsibilities of tobacco habitués. Surely the doctor is a little radical, but withal he has written an interesting and useful book.

C. W. B.

A PRACTICAL TREATISE ON SMALLPOX. By GEORGE HENRY FOX, A.M., M.D., Consulting Dermatologist to the Health Department of New York City, with the collaboration of S. D. HUBBARD, M.D., S. POLLITZER, M.D., and J. H. HUDDLESTON, M.D. Illustrated by colored photographs from life. Philadelphia and London: J. B. Lippincott Co., 1902.

WELL-MADE photographs of properly selected subjects render most valuable aid in the recognition of many cutaneous affections; indeed, in many cases they are more instructive than pages of the best text.

In this treatise an attempt is made to present by the aid of photography one of the most important of the eruptive diseases. In a series of fifteen plates, reproductions from photographs from life, the various eruptive stages of variola are presented, while a sixteenth is devoted to vaccination and varicella. Most of the portraits are colored, which—as a rule, to which, however, there are some exceptions—adds to their realistic appearance. Those representing the vesicular and pustular stages are beautiful examples of what photography is capable of in the way of accurate representations of cutaneous eruptions; it would be difficult, indeed, to improve upon them. But the photographs of the earliest stages of the disease are much less satisfactory, not through any lack of skill in the photographer, but because of the unfortunate limits of photography, the erythematous and papular lesions present at this period of the disease not lending themselves well to photographic reproduction. This is the more to be regretted because it is just in the early days of the malady that doubt and error in diagnosis are most apt to arise.

The text, which is intended to be practical rather than exhaustive, is clear and concise, the section of diagnosis being especially so. The occurrence of the lesions of smallpox on the palms and soles is especially emphasized as an important diagnostic symptom.

Although the very best illustrations possible will always be found inadequate substitutes for bedside experience, yet plates such as these are sure to be of great service to the inexperienced who have not had the opportunity to study smallpox in the living subject, and to these this illustrated treatise is heartily recommended. M. B. H.

THE HEALING OF NERVES. By CHARLES A. BALLANCE, M.S., F.R.C.S., and PURVIS STEWART, M.A., M.D., M.R.C.P. Illustrated by 16 plates and 1 figure in the text. London: Macmillan & Co.

THIS book is based on experimental sectioning of nerve trunks in monkeys, dogs, and cats, and on a study of nerves obtained during operations on human beings for the relief of injuries. The problem the authors consider is the process of degeneration and regeneration in a peripheral nerve after injury, with and without immediate or late suture, and the changes which occur in nerve grafts. The question is one of great scientific interest, and the carefully conducted experiments detailed by the authors go far to prove that the theory of regeneration now most popular is not correct. There are two theories as to nerve regeneration. The first is that it is central—that is, that the nerve axis cylinders which appear in the distal segment are direct outgrowths from

those in the central segments. This is the older and more popular theory. The "peripheral" theory maintains that the new fibres in the distal segment are formed from pre-existing cells in the distal segment itself. This is the opinion reached by the authors of this book. Their conclusions have an important bearing on the truth or falsity of the neuron theory, because if that theory be true regeneration ought to be impossible in a nerve trunk severed from its trophic centre. Since such regeneration does occur, our authors hold that the neuron theory, in so far at least as it applies to the peripheral nervous system, must be discarded. Whether time will prove that the conclusions of the authors are correct cannot be told; but this much is certain, that fewer men accept the neuron theory now than two years ago. The authors are to be congratulated on their work. There is no padding. The descriptions of the conditions found are brief and clear. The book is well made; the illustrations excellent. C. W. B.

AN EXPERIMENTAL AND CLINICAL RESEARCH INTO CERTAIN PROBLEMS RELATING TO SURGICAL OPERATIONS. An Essay Awarded the Alvarenga Prize for 1901 by the College of Physicians of Philadelphia. By GEORGE W. CRILE, A.M., M.D., Ph.D., Professor of Clinical Surgery, Medical Department, Western Reserve University; Surgeon to St. Alexis' Hospital; Associate Surgeon to Lakeside Hospital, Cleveland. Philadelphia: J. B. Lippincott Co., 1901.

THIS essay comprises an experimental and clinical research into certain subjects suggested by the writer's practical experience in the operating-room, and includes a study of the effects of severing and mechanically irritating the vagi, the effects of the intravenous infusion of salt solution, the physiological action of cocaine and eucaine, and the effects of temporary closure of the carotid arteries. The experiments were conducted on dogs, cats, and frogs, and extended over a period of three years. The author first reviews the literature of the subject under discussion, then sets down the details of the experiments, and finally points out the practical application of the results of the study, and gives a number of clinical histories to fortify the conclusions reached. The phenomena noted in the laboratory closely corresponded with those met in the operating-room.

Crile finds that no amount of mechanical irritation, even to the extent of destroying the vagi, is sufficient to arrest the heart's action, and that severing one vagus has practically no effect on respiration or circulation. He demonstrates that the blood pressure can be raised little if at all above the normal by the intravenous injection of salt solution, owing to its rapid escape from the vessels and to the automatic action of the medulla. When peripheral resistance is lost, as in fatal shock, no amount of infusion can do more than temporarily restore the blood pressure, and death is inevitable. It is interesting to note that Crile was able to amputate at the shoulder-joint in a woman, seventy-four years of age, without shock or hemorrhage, by employing one-eighth grain of cocaine in solution injected into the brachial plexus. Eleven operations about the head are recorded, in which the annoyance and danger of hemorrhage were entirely obviated by the application of a

specially constructed clamp to the dissected-out carotid artery. Experiments showed that this clamp could be left in position, closing the artery from twenty-four to forty-eight hours, without injury to the vessel's walls.

Unlike many interesting writings on surgical physiology, this volume is distinctly practical, and Dr. Crile deserves a great deal of credit for the infinite pains he has taken in conducting the researches. A sufficient number of illustrations are incorporated to elucidate the text.

F. T. S.

A SYSTEM OF PHYSIOLOGIC THERAPEUTICS. Edited by SOLOMON SOLIS COHEN, A.M., M.D. Vol. VI. DIETOTHERAPY AND FOOD IN HEALTH. By NATHAN S. DAVIS, JR., A.M., M.D., Professor of the Principles and Practice of Medicine in Northwestern University Medical School; Physician to Mercer Hospital and Wesley Hospital, Chicago; Member American Medical Association, American Climatological Society, etc. Pp. ix., 372. Philadelphia: P. Blakiston's Son & Co., 1902.

IN Part I. the General Principles of Diet and Diet in Health are presented in one hundred and seventy pages, divided into thirteen chapters. Here we find a full presentation of the results of laboratory research, charts and tables based upon them, and special chapters on Diet in Health, Infant Feeding, and Food as a Cause of Disease. Chapter IX. is devoted to beverages, and the alcohol question is conservatively and, indeed, discreetly managed—perhaps with a greater leaning toward discretion than modern investigation would likely carry us. In Part II., Diet in Disease is presented in twelve chapters, opening with one on Feeding of the Sick, which contains many common-sense ideas and practical points. Of these much can be said in praise. Of distinguished mention should be the fact that the author has conscientiously endeavored to translate the results of mathematical research into rules which may guide the practitioner in his labor for the welfare of his patients. In the main we find but little to criticise, and these points are rather matters of individual opinion and personal practice. For a brief, or rather a condensed, statement of what plan should be pursued in the presence of various pathological symptoms and conditions we heartily commend this part to the student and physician. A very complete index adds much to the usefulness of the work. To what may we attribute the successful result of the labors of the author? In the first place, he is writing at an auspicious time. The important investigations of Atwater are accessible, and have reached that point when they have furnished a sound working basis for clinical completion. Next, the analytical studies found in the work of Hutchinson were at hand, for comparison chiefly, at the later period of the work. Finally, the profession is fortunate in possessing an author who combines extensive information and broad, practical experience, with a judicial temperament. The opportunity and the mind to gain the greatest advantage from it have given as a result a compact, practical, and authoritative text-book, without the dogmatism of the laboratory alone or the speculation of unaided experience. The same combination of experiment and observation and theory and practice is bringing about great advances in

other lines of physiological therapeutics—in fact, in therapeutics not within the purview of the editor, yet just so surely physiological—and we take pleasure in noting this volume as one of the best records of the steady progress of the healing art and science which the modern medical spirit and method have given us. The volume is in good company, and yet will stand out with distinction. R. W. W.

CHIRURGIE GASTRO-INTESTINALE. By HENRI HARTMANN, M.D. Editor, GEORGES STEINHEIL. Paris.

THIS book consists of a complete exhibition of the modern surgery of the gastro-intestinal tract. In form it consists of seven lessons or chapters taking up in turn the various surgical procedures of the stomach and intestines, beginning with gastro-enterostomy and ending with excision of the rectum. It also contains an appendix giving a complete list of the author's personal operations in this region of the body. The illustrations are very numerous and particularly pleasing, following the text very closely. For a book of 150 pages it covers the subject wonderfully well. R. G. LE C.

CHARAKA-SAMHITA (translated into English). Published by AVINASH CHANDRA KAVIRATNA, Calcutta. Printed by B. N. Nandi at the Kaviratna Press, 1902.

THIS translation of the ancient Hindu system of medicine is published in fasciculi at short intervals, and is a valuable contribution to medical literature. The translation has been the work of many years, and a debt of gratitude is owing to its editor for issuing it in such an accessible form. It is not only of interest to physicians, but it also presents matter of value to metaphysicians and students of philosophy. F. R. P.

A TEXT-BOOK OF PRACTICAL DIAGNOSIS. The Use of Symptoms in the Diagnosis of Disease. By HOBART AMORY HARE, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Fifth edition, revised and enlarged. Philadelphia and New York: Lea Brothers & Co., 1902.

HARE'S *Diagnosis*, revised and brought up to date, has just appeared in its fifth edition. The fact alone that the work has passed through such numerous editions in a period of six years speaks eloquently in its praise. As in former volumes, various pathological conditions are considered and grouped according to their most salient symptomatological manifestations, and are treated of in the true and practical manner which is characteristic of the author. The text is liberally illustrated by appropriate cuts and half-tones, the sections dealing with the cerebral and spinal nerve tracts being most admirable in this respect. The work will, we have no doubt, as in the past, be one of great practical utility to both student and practitioner as a book of reference and instruction. G. W. N.

INTERNATIONAL CLINICS. Edited by HENRY W. CATTELL, A.M., M.D., Philadelphia, U. S. A., with the assistance of various collaborators. Vol. III. Twelfth series. Pp. 306. Philadelphia: J. B. Lippincott Company, 1902.

THIS volume opens with a remarkably clear and discriminating paper on the Treatment of Typhoid Fever, by Osborne, who presents a well-balanced, common-sense method in which the patient as well as the disease are considered. Mauger supplements this by taking up the question involved in Intestinal Perforation. Crothers, although presenting nothing especially new, gives good advice on the Treatment of Morphinism, and, unlike most men working in narrow specialties, uses proper nomenclature—*i. e.*, morphine, *not* morphia. Hallopeau, writing on the Urticarias, offers a thorough digest of the subject, based on an extended experience, granting that instances of these conditions are as frequent as they were at the St. Louis in our student days under Fournier. In medicine a very substantial article on Splenomyelogenic Leucocythæmia, by Nabarro, a discursive paper by Thayer as to what extent can general practitioners make use of the new diagnostic methods, a further communication on the insect pests of human beings, by Walsh, and three papers of interest both to neurological and general practitioners, by Hopkins, Brower, and Boggen afford much profit and instruction. No complaint can be made by the physician of either the quality or quantity of the material offered. In surgery, Brinton on Some Effects of Firearms at Short Range is likely to add to our knowledge in advancing theories backed by experimental work. Two papers on Dilatation of the Stomach, by Debove and by Cardarelli, cover all aspects of the subject. Willard throws considerable light on the Treatment of Inveterate Club-foot. Obstetrics and Gynecology are represented by two short papers by Baldy and Jardine. An article of unusual importance, and noticeable for its clearness and conciseness, positive, yet not dogmatic, is that of Packard on the Indications for the Removal of the Faucial Tonsils and the Best Methods of Accomplishing It. Syphilis of the Eye, Trachoma, and Acute Mastoiditis are found among other subjects discussed in this section. Pavlof's researches again attract our attention in the paper by one of his pupils—Borrissof—and we are likely to receive both new and novel ideas in the matter of the digestive glands. Schmaus closes the volume with a critical study of the Theory of Inflammation. In variety of topics and number of good names this certainly holds its own with its predecessors; in interest it would be difficult to surpass them. R. W. W.

TRAITÉ DE CHIRURGIE CLINIQUE ET OPERATOIRE. Published by A. LE DENTU et PIERRE DELBET. Volume X., First and Second Parts. Paris: J. B. Baillière et Fils.

THE tenth volume of this well-known system of surgery consists of two parts, the first treating of diseases of the testicle and cord and of the diseases of the female generative organs; the second continues the discussion on gynecological subjects, and also treats of the surgery of the extremities. The two parts number 1330 pages and contain 333 illustrations through the text. They follow in every way the high standard of the volumes that have already appeared. R. G. LE C.

WATER AND WATER SUPPLIES. By JOHN C. THRESH, D.Sc. (London), M.D. (Victoria), D.P.H. (Cambridge); Honorary Diplomate in Public Health, Royal College of Physicians and Surgeons, Ireland; Medical Officer of Health to the Essex County Council; Lecturer on "Public Health," London Hospital Medical College; Fellow of the Institute of Chemistry; Member of the Society of Public Analysts; Associate Member of the British Association of Water-works' Engineers; Examiner in Hygiene, London University, etc. Third edition, revised and enlarged. Pp. 517. Philadelphia: P. Blakiston's Son & Co., 1901.

THE first edition of this most excellent work appeared in 1896, and was a very welcome addition to the literature of a subject which of late years has become one of the most interesting to both lay and professional minds. The second edition improved upon the first, and this, the third, has in its turn improved upon its predecessor, not through the correction of faults and the strengthening of weak points, for such did not exist, but through being kept abreast of the times by the incorporation of the results of constant observation and research. The original chapters have been thoroughly revised, and new chapters dealing with the protection of underground and surface water supplies and with the economics of the subject have been added. In every way the book deserves the highest commendation. C. H.

ORIGINAL RESEARCHES IN THE TREATMENT OF TROPICAL DISEASES WITH INDIGENOUS DRUGS, etc. By HEM CHANDRA SEN, M.D. Cal., Teacher of Materia Medica and Therapeutics, Campbell Medical School; Physician to the Campbell Hospital, Sealdah, Calcutta. Printed at the Record Press, Calcutta, 1902.

A THESIS ON TROPICAL ABSCESS OF THE LIVER. By HEM CHANDRA SEN, M.D. Cal. Printed at the Record Press, Calcutta, 1902.

THESE two pamphlets represent the research and experience of an East Indian physician in the diseases indigenous to his country. The "Original Researches" consists largely of reprints of articles published elsewhere. The author, although of course practising medicine according to modern conceptions, introduces many interesting historical facts drawn from his profound knowledge of Hindoo learning. It is curious in reading these pamphlets to remark how much the ancient Hindoos really anticipated many of our modern ideas of physiology and therapeutics. The author gives a number of extremely interesting formulæ of medicines containing snake venom, derived from the Hindoo systems of therapeutics. He shows a very wide knowledge also of modern medical literature, especially, as would naturally be expected, of the medical literature of England and France.

Dr. Sen is to be congratulated on the interesting work which he has produced. F. R. P.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,

PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND,

AND

W. S. THAYER, M.D.,

ASSOCIATE PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND.

The Early Diagnosis of Attacks and Relapses of Acute Articular Rheumatism.—ACHALME (*Archives Générales de Médecine*, September, 1902, p. 257) asserts that of all the infectious diseases acute articular rheumatism is the one in which the physician is able to render his patient the greatest service by an early diagnosis. The earlier salicylate medication is used, the more efficacious it is. It shortens the duration and lessens the intensity of the disease, and indirectly by acting in this way diminishes the likelihood of the occurrence of organic heart lesions. He states, therefore, that it would be of the greatest possible importance if a diagnosis of rheumatism could be made in the pre-articular stage.

The writer remarks that, unfortunately, this is rarely possible, owing to the fact that both private and hospital patients seldom come under observation until after there are definite articular symptoms. After referring to the uncertainty and variability of the prodromal symptoms of rheumatism he states that clinical observation has taught him that there is a very important and fairly constant cardiac symptom which precedes the joint manifestations. This symptom is cardiac arrhythmia. This precedes the joint symptoms by four or five days. The pulse is irregular in force and particularly in rhythm. The heart beats occur in groups of two, three, or four. The heart's action is slowed to between 50 and 60. The examination of the heart in initial attacks at this stage usually shows no evidence of valvular disease. The same cardiac arrhythmia also precedes the onset of relapses of articular rheumatism by four or five days. He reports several observations in which the phenomenon was observed in relapse cases in hospital wards. The arrhythmia usually lasts forty-eight or sixty-two hours.

Achalme says that this cardiac irregularity is due either to a disturbance of the nervous mechanism regulating the cardiac action by some toxic substance, or to a lesion of the myocardium resulting from the local infection

with some organism. He believes that the latter hypothesis is the correct one, and advances experimental evidence to support this view. The writer has isolated a bacillus from the blood of several cases of articular rheumatism. He injected into the ear veins of a series of rabbits 2 c.c. of a culture of this organism. In 60 per cent. of the cases a definite cardiac arrhythmia, similar to that observed clinically, occurred. It develops from six to twelve hours after the injection and before any other phenomena. According to the age of the animal death may occur in twenty-four to forty-eight hours, eight days, or recovery may occur. In the young rabbits which die rapidly one finds numerous micro-organisms in clumps in the myocardium. In the older animals which live a little longer one finds a fibrinous pericarditis without organisms in the exudate; the myocardium still shows foci of bacilli, although they are more scattered. If death be delayed for four or five days all the serous cavities contain a serous exudate which is tinged with hæmoglobin, but which is still sterile. Endocarditis did not develop in any of the animals. If the animals recover the temperature falls and the cardiac arrhythmia disappears completely in two or three days.

Achalme believes that his experiments indicate strongly that the cardiac arrhythmia in man is due to a bacterial infection of the myocardium.

Case of Tubercular Tumor of the Spinal Cord in a Child Two Years Old.—HUNTER (*Brain, Summer*, 1902, p. 226) reports the case of a child, aged two years, who, at eleven and twenty-two months, was said to have had attacks of "pneumonia." After the last attack the right arm was found paralyzed, and the left subsequently showed some paresis. When the case came under observation there was internal strabismus of the right eye. The head was turned toward the left shoulder. The right arm was completely paralyzed, the muscles being flaccid, but not wasted. There was some paresis and rigidity of the muscles of the left arm. The right leg was paralyzed, but the left not completely so. The knee-jerks were exaggerated and the ankle-clonus was present on both sides. The superficial reflexes were diminished and sensation was everywhere impaired. The child died eventually with unmistakable signs of meningitis.

The autopsy showed tuberculous lesions of both lungs. There was a characteristic tuberculous basilar meningitis. The meninges of the cord were also involved. The cervical enlargement was distinctly more voluminous than normal, and soft in consistency. The enlargement occupied five segments, beginning at the second pair of cervical nerves and ending at the seventh cervical. It was about one and a half inches long. On transverse section the enlargement was found to be due to a tuberculous nodule, occupying the centre of the cord, with but a narrow rim of cord tissue surrounding it. Careful study of fresh and stained sections indicated that the growth had commenced in the right posterior horn, which was almost obliterated. The right anterior horn had been almost entirely destroyed as well. The left anterior and posterior horns were uninvolved throughout. The centre of the nodule had undergone caseation. The stained sections showed that the ganglion cells of the gray matter were well preserved. This fact was probably responsible for the absence of wasting in the par-

alyzed muscles. An ascending degeneration was found in certain of the tracks in the white matter of the cord. This degeneration was attributed to the meningitis rather than to the tumor. The meningitis was believed to have produced its effects through direct action on the ascending fibres themselves, and in part indirectly by its effect on the posterior roots. The writer remarks on the rarity of such tuberculous nodules in the cord, unassociated with tuberculous nodules in other parts of the nervous system.

On a Powerful Specific for the Treatment of Malarial Fever.—GAUTIER (*Archives de Parasitologie*, June, 1902, No. 4, Tome v., p. 569), after a brief historical account of the use of arsenic in the treatment of malaria, states that it was formerly given more for its tonic and alterative effect than as a febrifuge. Moreover, its administration was practically always accompanied by that of quinine.

It is to Gautier that credit is due for demonstrating to the medical profession the beneficial effects of certain organic preparations of arsenic, the so-called cacodylates, in the treatment of malarial cachexia. His discovery of the general therapeutic effects of the cacodylates was made in 1898, in which year he presented a communication before the Academy of Medicine in Paris. With the cacodylates he cured two cases of pernicious malaria, one of which had been suffering from malarial relapses since 1861, and both of which had not yielded satisfactorily to quinine.

Since his first communication he, with the assistance of his medical confrères, some of whom were practising in the French colonies in Africa, has been experimenting with various organic preparations of arsenic in the treatment of malaria. As a result, he finds that disodic methylarsenate, $AsCH_3O_3Na_2$, is a powerful specific in malarial fever. It is closely allied in composition and constitution to sodium dimethylarsenate or cacodylate. The disodic methylarsenate was put on the market in Paris as the "nouveau cacodylate, sel arsenical B, arrhénal." It has been shown to be non-toxic and may be given either by mouth or hypodermically. Gautier recommends its use by subcutaneous injection, as it is more rapid in its effect and causes no local reaction. It is given in doses of from 5 to 10 centigrammes. Gautier has used it in nine cases of pernicious malaria which had not yielded to the administration of quinine. Detailed notes of seven of these cases are given. In some of the cases a single injection of 5 or 10 grains of the disodic methylarsenate caused an immediate cessation of the febrile paroxysms and a complete and persistent disappearance of the malarial organisms. Sometimes two injections, but very rarely more than three, were necessary to produce a permanent cure. The drug has the advantage over quinine in that it does not in any way upset digestion. It seems to stimulate the appetite. It appears to have a remarkable action in rapidly overcoming the malarial anæmia, increases of from 300,000 to over 1,000,000 red cells in forty-eight hours after the first injection being recorded. Gautier believes the drug is a more powerful specific than quinine.

Tabes in Hereditary Syphilitics.—BABINSKI (*La Semaine Médicale*, November 5, 1902, p. 369) says that, although there are not more than twenty recorded cases of tabes in individuals suffering from inherited syphilis, yet

he is inclined to believe that such cases occur more frequently than is generally supposed. He reports two instances which are especially interesting, in that the father of both subjects was himself suffering from locomotor ataxia.

The first patient was a girl, aged twenty-two years, with Hutchinson's teeth. At birth she had anal ulcerations, and attacks of convulsive tic since seven years of age. When seventeen she developed an interstitial keratitis of the type seen in hereditary lues. For the past two years she had been suffering from shooting pains, and her pupils failed to react to light. The girl's father had contracted syphilis and had contaminated his wife at the time she was pregnant. He himself had characteristic signs of tabes; absence of patellar and tendo-Achilles reflexes, vesical symptoms, shooting pains, and Argyll-Robertson pupils.

The second case was a girl, aged fifteen years, whose pupils were inactive to light and whose patellar and tendo-Achilles reflexes were absent. She had vesical symptoms and a left-sided syphilitic choroiditis. The cerebro-spinal fluid showed a lymphocytosis. She had mental symptoms resembling either those of dementia præcox or of a diffuse meningo-encephalitis.

Babinski thinks that the knowledge of the occurrence of such cases is of practical importance, in that the thorough and prolonged use of mercury may have a definite influence in retarding the development of the tabetic symptoms.

Treatment by the Tourniquet to Counteract the Vasomotor Spasm of Raynaud's Disease.—CUSHING (*Journal of Nervous and Mental Disease*, November, 1902, p. 657) reports a case in which he adopted the unique treatment of applying a tourniquet for the relief of the pain produced by the vasomotor spasm of Raynaud's disease. The patient, a married woman, aged thirty-five years, was admitted to the Johns Hopkins Hospital under Dr. Osler on October 29, 1901, complaining of "blueness and pains in the extremities." Every winter since childhood she had suffered from attacks of chilblains. During the attacks the toes and fingers would become "red and swollen and would itch and burn." In March, 1901, these symptoms became much aggravated. From that date up to the time of admission a condition of local asphyxia of all the digits had been present, with exacerbations of almost daily occurrence. The arterial spasm was pronounced and was associated with intense pain. On several occasions these attacks were so severe that slight superficial patches of terminal gangrene had affected the pads of one or more of the toes or fingers. Treatment up to admission had been without avail, and there had been almost a daily use of morphine to relieve the pain and induce sleep. After she entered the hospital all the usual methods of treatment, except galvanism, had been tried, without avail.

Raynaud's original theory explaining the local syncope, local cyanosis, thrombosis, and gangrene characterizing the disease known by his name, has not been disproved by subsequent investigators. He believed that the disease was due to an excessive irritability of the vasomotor centre or centres, leading to constriction of the arterioles in certain vascular areas, the exciting cause being a peripheral irritant, usually cold. The treatment naturally must be directed toward overcoming this abnormal vasoconstrictor spasm.

The use of the tourniquet was suggested to Cushing by observing the phenomena following the removal of the tourniquet after operation. After its removal a flushing of the member with arterial blood almost invariably occurs peripherally to the site of constriction. This is presumably due to the temporary paralysis of vasomotor control to the part below the encircling bandage. The constriction causes in some way a "blocking" of the non-medullated fibres. It was the familiarity with the vasodilatation occurring under these circumstances which suggested the employment of a similar procedure as a therapeutic measure to counteract the local conditions of spasm which characterize Raynaud's disease.

The tourniquet was first applied for two minutes on November 10, during an exacerbation of pain and asphyxia in the left upper extremity, a flat rubber bandage being used. It caused some temporary discomfort, but its removal was followed by a much more readily palpable radial artery and great relief to the pain. From this on the tourniquet was applied daily to one or other extremity as conditions indicated. The patient immediately began to make rapid improvement. The pain was always greatly ameliorated, and the attacks became gradually less frequent. Finally they ceased, and she was eventually discharged on December 28, apparently quite well and with the extremities presenting their normal physiological tint.

SURGERY.

UNDER THE CHARGE OF

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The External Dorsal Luxation of the Metacarpophalangeal Joint of the Thumb.—GRISEL (*Revue de Orthopédie*, January, 1902), in a critical and exhaustive review of this subject, states that the pathological anatomy of the complete variety of the dislocation has been well shown by the researches of Vitrac, who gives the following résumé of the lesions: 1. Tearing of the two lateral ligaments. 2. Displacement of the tendon of the long flexor to the outer side of the metacarpal head. 3. Tearing of the phalangeal tendinous sheath, with displacement of the tendon to the outer side of the intersesamoid space. 4. Tearing of the adductor muscle, with or without penetration of this muscle by the head of the sesamoid. The symptoms have been well described in the observations of Guermonprez, and are those of the habitual luxation in the Z position—shortening of the thumb and a variable degree of mobility of the phalanx and three characteristic signs: 1. The situation of the phalanx over the external surface of

the metacarpal. 2. The presence of the flexor tendon, which sometimes may be easily shown, over the external surface of the metacarpal. 3. The forced adduction of the metacarpal bone with its head prominent under the skin of the inferior portion and internal to the thenar eminence in the region of the metacarpal bone of the index finger. This permanent adduction is a double obstacle to reduction because: 1. The adduction being complete it is impossible to carry the bone further away so as to relax the muscular buttonhole at the moment of reduction. 2. The metacarpal bone falls down into the palm of the hand and increases the difficulty of releasing the articular head of the phalanx.

In the complete external dorsal luxation the symptoms are: 1. The situation of the phalanx over the external surface of the metacarpal bone. 2. The presence of the tendon to the outer side of the head of the metacarpal bone. 3. Forced adduction of the metacarpal bone. Beyond the phalanx to the outer side of the metacarpal one may see: 1. The lateral ligaments in part torn and in part detached and having carried away with them the periosteum and lateral portion of the metacarpal bone. 2. The dorsal portion of the capsule and the periosteum of the dorsal surface are elevated by the passing of the phalanx over the back of the metacarpal bone. 3. The turning back of the gleno-sesamoid band which remains adherent to the phalanx. 4. The existence of a buttonhole through which passes the metacarpal bone; the internal edge of which is formed by the adductor, and the external edge by the flexor tendon, external sesamoid bone, and external sesamoid muscle, and the eyelet corresponds to the internal sesamoid. 5. The flexor tendon is maintained between the sesamoids in the fibrous tissue which crosses obliquely the external border of the metacarpal bone to reach the slip of the short flexor.

The causes of the irreducibility of the external complex luxation are: 1. The flexor tendon being torn from its phalangeal sheath is no longer next the phalanx and the sesamoid during the manœuvres of reduction. It either remains curled up near the metacarpal bone, or it is interposed between the articular surfaces. 2. The sesamoid bones may not constitute an obstacle to reduction if there is a sufficient separation of the phalanx and the metacarpal bones for them to pass. 3. A luxation that is irreducible, notwithstanding the separation of the two bones sufficient for the passage of the sesamoids, may be reduced by section of the flexor tendon.

In those cases of habitual complicated luxation which often present themselves for treatment, where the section of the glenoid ligament is not sufficient, the surgeon has the choice of any one of three solutions of the problem: 1. The complete elevation of the gleno-sesamoid covering. 2. Section of the lateral ligaments and the attachments of the sesamoid muscles. 3. Resection of the head of the metacarpal bone.

Femoral Osteotomy and Ostectomy in Ankylosis of the Hip in Malposition and in Certain Fractures of the Femur United in Malposition.—VINCENT (*Revue de Chir.*, 1902, No. 10), after a detailed review of the subject, states in conclusion: 1. The application of the vise of Lorenz during the course of osteotomy for the relief of viciously consolidated fracture of the diaphysis of the femur, with marked over-riding of the fragments, is a

useful procedure. It is much more powerful than manual traction, and may be used with sureness and precision. 2. This method is especially valuable in the bony section in the form of a Z, which gives to the reduced osseous surfaces a true notch, and permits of the advantages of the oblique osteotomy for the coaptation of the fragments and avoids the necessity of applying continuous extension, which is painful and uncertain in its results.

The Fracture of Dupuytren.—MALLY and RICHON (*Revue de Chir.*, 1902, No. 10), after an exhaustive review of the subject, state in conclusion: 1. By the term fracture of Dupuytren is meant the bimalleolar fracture of the leg by adduction, that is to say, fracture by tearing away of the internal malleolus from its base or its end, or, more rarely, laceration of the internal lateral ligament, fracture of the fibula to the upper side of the inferior tibiofibular ligament, and separation of the ends of the bones forming the inferior tibiofibular articulation; this last may not occur. It is always an articular fracture. 2. The prognosis is extremely grave from the point of view of function. In spite of well-directed therapeutics, at the moment when the consolidation should be theoretically well advanced one may observe, during the period of convalescence, two sorts of secondary complications: *a*. First and almost constant, but of variable severity, is the muscular atrophy of muscular origin affecting unequally the motor muscles of the tibiotarsal articulation, and at the same time one sees the various cutaneous and vasomotor trophic disturbances. *b*. A secondary deviation of the foot progressive to valgus. 3. This muscular atrophy has the characteristics of the reflex muscular atrophy, and permits in consequence the atrophy of a certain number of the motor cells of the anterior horns of the cord in the region of the dorsolumbar enlargement. 4. The existence of trophic phenomena in the skin and vasomotor system with the muscular atrophy permits the belief that the deviation of the foot has as its primary cause a similar trophic trouble, which causes alteration of the structure of the ligaments and interference with the normal progress of ossification of the callus. These primary alterations of the ligaments and the callus are, according to the authors, of trophic origin, and allow the weight of the body to efface the plantar arch, permitting the astragalus to "see-saw" downward and inward. This movement of the astragalus is assisted by the stretching of the internal ligament by the callus, and the forcing to the outer side of the fibular malleolus, which transmits a portion of the weight of the body upward and outward to the external face of the astragalus, the fibular callus yields and the bone becomes ultimately bent. 5. The spinal lesions which cause the trophic phenomena have not been exactly determined; those which cause the atrophy of the muscles consist essentially in the diminution of the motor cells of the anterior horn with atrophy of their pigment and effacement of their cylindrical prolongations. 6. The pathogeny that the authors have proposed to explain these secondary complications is entirely new and is justified by the statement of Tillaux: "There is no other fracture in which the treatment is more important and more difficult than in the bimalleolar fracture by abduction." 7. The immediate treatment should consist in the application of a dressing which will accurately maintain reduction; the dressing should be so applied that the internal

malleolar region is freely accessible. In order to fulfil these indications the authors have proposed the use of a plaster-of-Paris trough of special design, the foot first being placed in forced adduction. If the œdema of the soft parts is very pronounced, massage and evaporating lotions should be used for several days preceding attempts at reduction. If the fracture is compound, reduction should be preceded by a vigorous disinfection of the wound. 8. The callus almost always is retarded in its consolidation, and so when one removes the plaster trough it is essential to maintain the instep not only laterally but also underneath the arch by a suitable bandage, so as to prevent the secondary deviation to the position of valgus. 9. The muscular atrophy which is peculiar to these articular fractures, and which is spasmodic, demands for its relief an altogether different treatment from that of simple atrophy. All forcible manipulations of the joint and the direct excitation of the muscles by either massage or electricity are absolutely contraindicated. Local sedative applications, with counterirritation over the spine, may prove to be of value. The author's experience shows that static electricity best fulfils this last indication. 10. Union in bad position is a serious condition, and demands surgical intervention for its relief. According to the severity of the case, one may have recourse to either simple or wedge-shaped osteotomy, resection, astragalectomy, and, finally, the wiring together of those fragments which show no tendency to become united.

THERAPEUTICS.

UNDER THE CHARGE OF

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Concerning a New Series of Synthetic Salts of the Nucleids of Iron, Copper, Mercury, and Silver.—DR. E. R. LARNED gives a summary of the steps which have led up to the commercial production of these new compounds of nucleinic acid and the metals—iron, copper, mercury, and silver. They are known under the trade names of *ferrinol*, *cuprol*, *mercurol*, and *argol*, respectively. He summarizes their advantages as follows: 1. These new salts of nucleinic acid are rational reconstructives; they are true tonics; they increase physiological resistance; they increase the functional activity of secretory organs. 2. They are powerful germicides, and are not harmful to the tissues. 3. If the present state of our knowledge of the nucleins and leucocytosis is correct, then the nucleid is the proper form for the administration of the metals.—*Therapeutic Gazette*, 1902, vol. xxvi. p. 593.

Peridynamin.—Dr. O. Liebreich writes on a new iron preparation by this name. In its action it resembles ferratin, and is useful as a hæmoglobin former.—*Therapeutische Monatshefte*, 1902, vol. xvi. p. 423.

The Serum of Trunecek in Arterio-sclerosis.—Dr. S. Sehouriguine recalls the serum that Trunecek devised over a year ago for the treatment of arterio-sclerosis. This was: sodium sulphate, 16; sodium chloride, 140; sodium phosphate, 5; sodium carbonate, 7; potassium sulphate, 13; water 1440. The author reports his results obtained with a patient, aged eighty years, suffering from arterio-sclerosis. The symptoms were marked depression and pain over the heart region. During a space of five weeks seven injections were given. The oppression diminished, cyanosis of the lips disappeared, and the old man declared himself young again.—*Thérapeutique moderne Russe*, 1902, vol. v. p. 20.

Agurin: A New Diuretic.—Dr. M. Salacoln has administered to a certain number of patients a new diuretic obtained from theobromine, and called agurin (a double salt of sodium acetate and theobromine). In all of his cases he found a constant increase in the amount of urine passed, with a maximal amount occurring three to five days after the administration of the drug. There was also a slight increase in the arterial pressure. In arterio-sclerosis with cardiac or renal disease the diuresis has been more marked and the beneficial effects more pronounced than in cases of hepatic cirrhosis. The remedy was well borne, and could be employed for several weeks without discomfort. In one case of marked arterio-sclerosis there was gastric irritability. The dose is 7 grains at hour intervals. It can also be given by the rectum.—*Thèse de Paris*, 1902, No. 566.

The Therapeutic Value of the Alkaline Vichy Waters.—Dr. Oscar Liebreich speaks of the differences of natural and artificial mineral waters, claiming that no amount of detailed chemical analysis and subsequent compounding can ever duplicate the natural mineral waters. This is due to several factors—inaccuracies of weighing, the presence of bodies which split up and are destroyed in chemical manipulation; and then, again, from the standpoint of manufacturing, the impossibility of obtaining pure products at reasonable prices. Further, nearly all natural mineral waters contain a colloid substance, formerly termed glairin; this has never been reproduced, and in Leibreich's opinion it is of importance therapeutically. In natural waters, also, carbon dioxide exists in two forms—the anhydride and the hydrate. Artificial waters are impregnated only with the anhydride. Of the different Vichy springs, he points out that they are not identical in character, but, broadly speaking, they are very similar with regard to their alkalinity. Nevertheless, the two springs which are mostly used—the Grande Grille and the Célestins—have different therapeutical effects. The modern therapeutist is bound to take into account the chemical composition of the remedies used, and an ingredient, even when present in very small quantities, is capable of bringing about some action, especially since the presence of other ingredients may cause synergistic action. Of the various diseased or disordered states that are best adapted to treatment by these

mineral waters the author speaks of gout and diabetes mellitus—especially of pancreatic origin—and particularly for the prevention of diabetic coma. In chronic catarrhal diseases of the stomach the alkaline mineral waters have been regarded almost as specifics. They increase peristalsis, diminish the hyperacidity of the mucous glands, and stimulate the production of the digestive ferments. In gastric ulceration in anæmia it is desirable to keep the secretions alkaline by these waters. In Reichmann's disease they are indicated. The Vichy waters are also available in diseases of the liver, particularly in those conditions that favor the formation of gallstones. Other conditions are mentioned by the author, such as albuminuria and certain skin diseases.—*British Medical Journal*, 1902, No. 2180, p. 1159.

Physical Therapy.—Dr. Franz C. Müller, of Munich gives a complete review of the newer literature on balneotherapy, hydrotherapy, and light therapy.—*Schmidt's Jahrbücher*, 1902, vol. cclxxvi. p. 6.

Dangers of Subcutaneous Gelatin Injections.—Drs. Margoniner and Hirsch point out that for a long time pain and a feeling of tension, abscess formation, and fever were considered the only untoward symptoms following the injection of glycerin, until several cases of tetanus were reported, which necessitates extreme care in proper sterilization. The author dissolves 2 grammes in 100 cubic centimetres of warm physiological salt solution and then exposes the flask for one hour to live steam at 100° C. The injection must be made by means of a syringe which permits of perfect sterilization. The results were very satisfactory, and gelatin was found to be an excellent hæmostatic especially in prolonged cases of hæmoptysis. The emboli which occasionally have been reported are not the result of the gelatin, but may follow any subcutaneous injection.—*Therapeutische Monatshefte*, 1902, Heft vii. S. 334.

X-ray Treatment of Carcinoma.—Drs. Wallace Johnson and Walter H. Merrill publish a table showing that of 16 cases of epithelioma treated, regardless of their length of existence, extent of tissue involved, and previous treatment, 10 patients, or 62.5 per cent., are apparently cured; and, in addition, 4 cases, or 25 per cent., show improvement, and 3 of these give promise of ultimate recovery under further treatment. Only 2 cases, or 12.5 per cent., failed to derive benefit from the treatment other than alleviation of pain and diminution of discharge. Of 7 carcinomas treated, all of which were classified as inoperable by the surgeons, none showed any improvement beyond relief from pain and probably a temporary delay in the final fatal termination. Lupus vulgaris can be cured, fibromas show no change at all. Three or four semiweekly exposures of four to five minutes' duration were sufficient to produce a reaction.—*American Medicine*, 1902, vol. iv. p. 217.

Drops as Dose Measures.—Dr. M. I. Wilbert publishes several tables which show that little or no uniformity can be expected in comparative results on the number of drops to be obtained from different dropping surfaces. The irregularities are so apparent and so great that they suggest that every dropping surface is a law unto itself with each and every liquid. A reasonable

and practical standard would be to accept a drop of water as being equivalent to the tenth part of a gramme. This would be a convenient number to remember and would be in harmony with the metric system, and, in addition to this, it would represent the most readily obtained drop of water, dropping in seconds from the greatest variety of dropping surfaces. Then, too, all possible error would be on the side of safety. From the writer's experience it would appear that the difference in the space and thickness of the lip of a vial is a greater factor in the size of the resulting drop than the quantity of liquid it contains, and a rough or ground-glass surface offers more attraction for the spread of a liquid and would give a larger and more uniform drop of water than one that is quite smooth. A clean, smooth surface, however, would give more uniform and larger drops than one coated with even the slightest trace of fat or oil. Of course, it would be most simple to do away with drops entirely, but for potent remedies which are constantly increased or decreased in dose they are indispensable.—*American Journal of Pharmacy*, 1902, No. 8, p. 375.

Relation Between the Chemistry and the Physiological Action of Morphine.—Dr. E. Vahlen, assuming from the large size of the morphine molecule that not all of its atoms take part in its physiological action, has attempted to isolate that physiologically interesting nucleus upon which most of the efficacy depends. In so comparatively new a branch of pharmacology the difficulties of research are obvious, since it is only rarely that by the breaking up of a molecule components are obtained which resemble the mother-substance in effect. More often one common ingredient is found in a number of drugs of the same action and close chemical relation, as in the case of the purin obtained from caffeine, theobromine, and allied alkaloids, upon which most of their action depends. In starting his experiments the author assumed that the phenanthrene nucleus was the chief carrier of its function; and as it seemed desirable to add nitrogen—an important element in most alkaloids—he discovered a synthetic combination of the two, which he named morphigenin. Chemically, it is oxyamidophenanthrene, and it seems, indeed, as if it closely resembles morphine physiologically—so much so that a readily soluble derivative has been brought on the market under the name of epiosin. There are other products with the same nucleus, and also narcotic in effect, that could be formed, as by the action of zinc chloride giving morphigenin chloride. Several could be obtained by combining sulpho-acids with morphigenin, but no stable compounds resulted from all these experiments, and so their importance is diminished. To manufacture epiosin, one part of morphigenin chloride, with three parts of sodium acetate, twelve parts of absolute alcohol, and one and one-half parts of an aqueous methylamine solution, 33 per cent. in strength, are heated for two hours in the water-bath, with subsequent evaporation and extraction with chloroform. Epiosin, chemically, is a methyldiphenylenimidazol. It melts at 383° F., and is readily soluble in alcohol and chlorform, and its chlorides are soluble in water. When it is injected into frogs the functions of the cerebrum are first paralyzed, and later those of the spinal cord; when injected into dogs, there is a blunting of the sense of pain, not leading to sleep, a sluggish corneal reflex, involun-

tary defecation, urination, and salivation, and a slight rise of blood pressure, with slowed and shallow breathing. The pupillary changes were, unfortunately, not recorded, but no marked myosis occurred. Convulsive twitchings were observed when larger doses were used. On man it showed a ready relief of pain, with sleep and no after-effects. The dose of episin chloride is one-seventh to 2 grains, and 4 grains correspond to 1 grain of dionin.—*Archiv für Experimental Pathologie und Pharmacologie*, 1902, Band xlvii. p. 368.

Decomposition of Iodides in the Body.—Dr. A. Stepanow analyzed the different organs for nitrites with sulphanilic acid, naphthylamin, and acetic acid, in order to explain the splitting up of potassium iodide in the body. They were found present in the white substance of the brain, lungs, bronchi, parotid, duodenum, medulla of kidney, suprarenals, testicles, and in the parotids, while in the gray brain-matter, liver, stomach, spleen, cortex of kidney, and blood they could not be detected. The conclusion is drawn that in decomposing the iodides, the nitrites, in conjunction with the carbon dioxide of the tissues, play an important part, but that there are also other factors which are not known.—*Archiv für Experimental Pathologie und Pharmakologie*, 1902, Band xlvii. p. 411.

Some Principles of the Brain of the Horse.—Dr. A. Bethe was able by the following method to isolate several new principles occurring in the central nervous system of the horse. The brain and spinal cord of recently slaughtered animals were freed as much as possible from membranes and large vessels, comminuted, and triturated with water containing much copper chloride until a distinct green color remained after several days. Potash lye up to a distinct violet color was then added, and, on the following day, alcohol and hydrochloric acid, which removed biuret, cholesterin, and certain bodies containing phosphorus, which can easily be isolated. The residue was again treated with potash lye, acidified with acetic acid, and dehydrated with alcohol. On dissolving in chloroform, concentrating, and dropping into ethylic ether, a fine green precipitate resulted, while the ether itself took on a dark green color. The precipitate was found to consist of three definite substances: (*a*) *Amidocerebrininic acid-glycoside*, easily soluble in benzol, chloroform, and hot alcohol, insoluble in ethylic and petroleum ether. On boiling with water it also dissolved in this, yielding an opalescent, gelatinous solution. Precipitation occurred with barium in hot alcoholic and with copper in slightly alkaline or acid solutions. The melting point was found to be 354° F., and analysis gave the following figures: C = 70.19, H = 11.08, N = 1.86. By boiling with hydrochloric acid, sugar (galactose), an acid free from nitrogen (cerebrininic acid), and a nitrogenous principle (cerebrininic acid amide) resulted. (*b*) *Phrenin*, soluble in hot alcohol, insoluble in ether, and precipitating well with barium, but not with copper. The melting point could not be definitely determined, but seemed to lie somewhere between 190° and 213° F. The elementary analysis gave C = 71.9, H = 11.95, N = 1.45, and it seemed as if the substance represented an amido-acid, or an acid amide with a free acid molecule. (*c*) *Cerebrinin-phosphoric acid*, a neutral, crystalline body, soluble

in hot alcohol and ether and in chloroform, and melting at 321° to 323° F. By boiling with hydrochloric acid it split up into five distinct substances: (1) Galactose, (2) phosphoric acid, (3) cerebrininic acid, (4) amido-cerebrininic acid, and (5) a nitrogenous water-soluble principle.— *Archiv fur Experimental Pathologie und Pharmakologie*, 1902, Band xlviii. p. 73.

PEDIATRICS.

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The Leucocyte Count in the Diagnosis of Diseases of Children.—GEORGE DOUGLAS HEAD (*Archives of Pediatrics*, April, 1902, p. 253) calls attention to the value of leucocyte counts in the differential diagnosis of certain diseases of early life. From the conclusions of various observers it is probable that in healthy infants a mild degree of leucocytosis occurs during the first year of life, and this is somewhat diminished during the second year; but beyond the age of two years in healthy children the count is not different from that of adults. From one to two years the count may be of considerable value if one is careful to exclude the leucocytosis of digestion; but even at this age the chief value of the procedure must be to assist in the identification of such diseases as are characterized by a diminution rather than an increase in the leucocytes. This group of diseases includes typhoid fever, influenza, measles, malarial fever, and miliary tuberculosis, and, perhaps, tuberculous meningitis. Beyond two years of age the leucocyte count in diseases of children is as invariable and as fixed as in diseases of adult life.

In typhoid fever in children the low leucocyte count is constant, being raised above the normal figure only in the presence of complications. If in a case of suspected typhoid fever in a child the count is over 10,000, the diagnosis of uncomplicated typhoid fever cannot be entertained, and a complication is to be looked for whether the symptoms indicate it or not. But the count is of most value when the clinical symptoms have narrowed the diagnosis to a choice between typhoid fever, on the one hand, and meningitis, osteomyelitis, appendicitis, or some other infection; for in all the latter group there is an increase of the white blood count.

In adults typhoid hemorrhage or perforation is followed by a prompt rise in the number of leucocytes. There are, however, numerous exceptions to the rule, and practically the knowledge furnished by the white count is this: if, in a case of typhoid fever, symptoms pointing to perforation or hemorrhage are observed, a rise in the leucocytes strengthens the evidence that perforation or hemorrhage exists. While none of the cases in the series of children's

cases collected by the author was thus complicated, it is to be presumed that the rule in adult cases would be followed.

Appendicitis in children, as in adults, is accompanied by a well-marked leucocytosis. The count is thus of value in differentiating appendicitis from attacks of abdominal pain from renal calculus, gallstones, acute intestinal obstruction, and typhoid fever, all of which have a normal or diminished count. From acute gastritis, acute nephritis, or acute enterocolitis, all of which cause leucocytosis, differentiation could not be made. Again, when the symptoms of appendicitis give no clue to the course the disease is pursuing the leucocyte count is often of valuable assistance in following the course of the inflammation. No conclusions, however, can be drawn concerning the severity of a given case, unless successive counts have been made from the outset of the disease.

In lobar pneumonia a pronounced leucocytosis is encountered. An average of the cases under five years gives 41,090, while for cases over five years the average count is 26,800. The number of complicated cases is too small to give satisfactory conclusions.

In cases of pneumonia simulating typhoid, malaria, or influenza, a high leucocytosis rules out these three common infections, but is of no value in distinguishing it from cerebro-spinal meningitis or appendicitis.

Only three cases of bronchopneumonia are included in the series, but from these it is probable that while leucocytosis accompanies the disease it is not as pronounced as pneumonia.

Meningitis (five cases) shows a pronounced leucocytosis, ranging from 14,200 to 40,600, which appears early in the disease and continues till death. Complications do not modify it. In the diagnosis between meningitis and uncomplicated typhoid fever the count, as already indicated, is almost, if not absolutely, diagnostic. Between meningitis and hysteria the count in two cases seen by the author has been diagnostic (6300 and 9000). As between meningitis and brain tumors, one case of the latter disease examined by the writer gave a count of 5500 in the second week of severe symptoms.

In diagnosis between tuberculous and non-tuberculous forms of meningitis no cases of children have been reported, and the counts in adults are conflicting.

In influenza in children it is probable that a normal or reduced count occurs in the uncomplicated cases, as in adults. The test will, therefore, be of value in differentiation from meningitis, and also in establishing the presence of a complication like lobar pneumonia.

In diphtheria the count is of little practical value. In measles, however, the count is normal or below during the whole course of the disease, but complications, such as bronchopneumonia, severe bronchitis, or otitis media, cause a leucocytosis in some cases.

German measles, according to Cabot, shows no leucocytosis, and mild scarlatina, according to Turk, shows nearly a normal number of leucocytes. If the infection is severe and the diagnosis lies between scarlatina and measles, leucocytosis would point to the former, a normal count to the latter.

In scarlet fever leucocytosis begins a day or so before the rash appears, reaches its height about the time of the full development of the exanthem, and falls with the fading of the rash, or may persist some days longer.

In variola, as already proven by Rick, no leucocytosis occurs prior to the formation of the vesicles; with their appearance the count rises, and reaches its height as the exudate becomes purulent. In very mild cases no increase occurs during the course of the disease. These statements probably apply to children, as well as adults. Since the initial rash of variola sometimes resembles that of scarlet fever, the white count might give valuable information early in the disease.

OBSTETRICS.

UNDER THE CHARGE OF

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Diagnosis by Vaginal Examination.—In the *Journal of Obstetrics of the British Empire*, November, 1902, STEPHENSON contributes an excellent paper upon this subject. He calls attention to the fact that with proper care, vaginal examinations are attended with but little danger, and that important knowledge regarding parturition can be obtained by this procedure only.

Although the usual belief is that the occiput is seldom upon the right side and anterior, or upon the left side and posterior, Stephenson finds this is erroneous. More frequently than ordinary statistics would lead us to believe, he has found the occiput anterior and upon the right or posterior and upon the left.

He also calls attention to the fact that in a pelvis of average dimensions and with a pelvic floor and perineum uninjured and not relaxed, it is impossible to touch the promontory of the sacrum. Many books and articles upon the subject of vaginal examination assert that the sacrum can readily be palpated including the promontory, an assertion which experience does not prove. If the observer finds that upon vaginal examination his fingers come readily in contact with the promontory of the sacrum he must conclude that the pelvis is considerably contracted.

In order to accurately appreciate what is meant by vaginal examination, Stephenson urges that the sort of vaginal examination made should be definitely stated, whether it is the ordinary examination or whether it be an examination made under partial anæsthesia or with pressure especially adapted to reach the higher points of the posterior pelvic wall. He refers in his paper to what is termed "ordinary vaginal examination."

Again, he calls attention to the fact that a frequent error is made in stating that upon vaginal examination as ordinarily made both fontanelles can be reached. This is never the case, but, on the contrary but one fontanelle

and the sagittal suture are available by ordinary vaginal examination. The same is true regarding the detection of the ear of the child, for upon ordinary examination, this cannot be felt.

Stephenson defines the normal range of vaginal examination as corresponding with the ligamentous boundary of the pelvic outlet. He asserts that in the upper part of a normal pelvis the fingers command only the anterior half of the pelvis, while in the lower division and on the pelvic floor they reach slightly beyond the transverse plane. He proves these statements by measuring the length of the fingers, finding that when two fingers are inserted the nearest distance at which effective touch can be made is three and one-half inches. He believes that in ordinary examinations the dorsal surface of the two flexed fingers does not pass beyond the transverse line joining the anterior margin of the tuberosities of the ischia. Even with strong pressure they cannot be forced beyond the plane of the outlet. He believes that when the fingers are fully introduced in the mesial line the tactile portion corresponds fairly with the central line of the pelvis. The os is usually found central, but is at times displaced. When the os is moderately dilated the fontanelles are not accessible, but the sagittal suture can be felt crossing the os. When the os is more dilated, or if the fingers can be passed within, a fontanelle may be felt. If it is the smaller the head is flexed; if the larger the head is somewhat extended. In estimating the degree of flexion, attention must be given to the presence or absence by palpation of the larger fontanelle. The more readily this is felt the greater the degree of extension which is present. He also calls attention to the fact that when all of the anterior fontanelle is not accessible a portion of it resembles normally the posterior fontanelle in being a small space enclosed by three bony lines.

Rapid Dilatation of the Uterus by Bossi's Dilator.—Before the Edinburgh Obstetrical Society at its meeting on November 12, 1902, SIMPSON (*British Medical Journal*, November 29, 1902) reported the case of a young primipara admitted to the Royal Maternity Hospital in violent eclampsia. The urine was highly albuminous and the cervix barely admitted one finger. In addition to treatment addressed to elimination and the control of the nervous system, under chloroform the cervix was gradually dilated with Bossi's dilator, securing complete opening of the cervix in twenty minutes. The child was delivered by axis traction forceps, but did not live. The patient had a number of convulsions afterward, in all eighteen during her treatment. She made a tedious but complete recovery.

At the same meeting FROST reported the case of a patient aged forty, eight months pregnant, seized with eclampsia. As the patient was profoundly unconscious, it was thought necessary to empty the uterus as soon as possible. Bossi's dilator was employed and the patient delivered by forceps. As the cervix was scarcely opened it was necessary to introduce the dilator without the shield. When the index registered 3½ cm. of dilatation the shields were applied, and the procedure continued until 9½ cm. of dilatation had been effected, when the instrument was finally withdrawn. The operation up to this point occupied thirty-five minutes. The application of the forceps was difficult, as the head lay above the brim and was movable. Convulsions con-

tinued for seventeen hours after delivery, growing gradually less violent. The patient regained consciousness about forty hours after delivery. No sedatives were employed, but hot packs were used persistently to secure thorough sweating. The albumin in the urine gradually decreased and the urea gradually increased. The patient was markedly jaundiced during convalescence, but finally made a satisfactory recovery. The child also survived.

In the *Centralblatt für Gynäkologie*, 1902, No 47, KNAPP adds a further paper to his original communication in the *Wiener Wochenschrift*, 1902, Nos. 41 and 42. He describes Bossi's dilator with illustrations, and continues to endorse it.

From the clinic in Carlsruhe comes a report by WAGNER (*Centralblatt für Gynäkologie*, 1902, No. 47) of three cases in which Bossi's dilator was used to open the cervix.

The first of these was a multipara who had had colpotomy performed previously to her present labor. The cervix was very slow in dilating, and the patient weak and highly nervous. Bossi's dilator was introduced after narcosis, and gave the patient but little suffering. In thirty minutes the cervix was completely dilated, and the patient shortly afterward could be delivered with Tarnier's forceps. Mother and child recovered well.

His second case was that of a multipara, aged forty-five, with slightly contracted pelvis, who had had very large children in transverse presentation. All the children had perished soon after labor. With the past history it was thought best to induce labor before the child became excessively large. The child was in the second transverse position, the back anterior. During dilatation the patient had almost no pains, and in sixty minutes the cervix was completely opened without rupturing the membranes. When dilatation had been complete for five minutes the membranes were ruptured, version made, and the child delivered. Considerable difficulty was experienced, as the arms were above the head, and the child was born asphyxiated and could not be made to breathe. As there was free hemorrhage, examination revealed laceration of the cervix, with arterial bleeding. This was closed by suture, and the patient made a good recovery. It is thought that the large head of the child tore the cervix and not the instrument used for dilatation.

The third case was that of a multipara, aged twenty-five, pregnant five months, who had suffered with profuse hemorrhage for three weeks. As the finger could not be introduced through the cervix to make accurate diagnosis, Bossi's dilator was used and a thorough examination made, finding a placenta prævia. The cervix and vagina were thoroughly tamponed, and the patient had sharp rise of temperature. On the following day the dilator was again employed, the membranes ruptured, and a macerated child delivered by version and extraction. The placenta had been deeply detached from the anterior wall of the uterus. In each of these cases the instrument worked to great satisfaction.

BISCHOFF, from the clinic at Bonn (*Centralblatt für Gynäkologie*, 1902, No. 47), reports five cases in which Bossi's dilator was employed with satisfaction. Three were cases of eclampsia and two of contracted pelvis. One of the eclamptic cases had contracted pelvis also. The children were delivered by craniotomy, version, and the use of forceps in accordance with the needs of each case. It was found that laceration of the cervix followed the use of

the instrument, but not to a severe degree and not sufficiently to bring the patient into danger. Bischoff believes that when the case is not serious and haste is not imperative the cervix can be dilated with less damage by other methods, such as the use of the bougie and elastic bags. Where, however, cases are brought into the hospital for operation, requiring delivery, where antiseptic precautions can be carried out and any operation necessary done promptly, the instrument should have a place and should be employed.

To the foregoing cases LANGHOFF (*Centralblatt für Gynäkologie*, 1902, No. 47) adds a case of eclampsia in which Bossi's dilator was used with excellent result.

MUELLER, of Munich, and FROMMER describe metal dilators similar in action to Bossi's, and urge the value of their use in properly selected cases.

Complete Inversion of the Uterus of Seven Months' Duration.—TAYLOR (*Journal of Obstetrics of the British Empire*, November, 1902) reports a case of a primipara in labor two days before delivery, who suffered severely from hemorrhage after the birth of the child. The condition was not recognized, and seven months after the occurrence of uterine inversion the patient was seen and a correct diagnosis made. Other means failing to reduce the inversion, the patient was stimulated for a short time, and under aseptic precautions, an anæsthetic having been given, the anterior vaginal wall was opened by a transverse incision as close to the inversion as possible. The uterus had been inverted so long that it had detached itself from its usual union with the bladder. The peritoneum was pushed up and the anterior margin of the cervix seized on each side by volsella forceps and the uterus opened between them with straight scissors. The appendages were almost entirely buried within the cup of the inversion. As the appendages were adherent it was necessary to carry the division in the uterus up to the fundus before they could be separated and the inversion thoroughly reduced. When this had been accomplished it was found that the peritoneal surface of the uterus was much smaller than the mucous surface, and here Taylor thinks that the uterine wall should have been resected to make a perfect closure. As the patient's condition was critical this was not done, but the uterus was closed with fine silk. An iodoform gauze drain was left between the uterus and the bladder. The patient made a tedious recovery, and the silk suture placed in the uterus had to be removed. She finally became completely convalescent, and on careful examination no trace of the inversion could be found.

The Operative Treatment of Face Presentation with Posterior Turning of the Chin.—STROGANOFF presented at a meeting of the Russian Society for Obstetrics and Gynecology (*Monatsschrift für Geburtshülfe und Gynäkologie*, Band xvi., Heft 5, 1902) a paper upon this subject in which he described some of the results which he had obtained in these cases.

The first was a multipara with fairly sized pelvis in whom the fœtus presented with the chin directed toward the right side and behind. The patient was seized with eclampsia. The head descended very slowly, a swelling forming upon the forehead and both cheeks. The long diameter of the face was in an oblique diameter of the pelvis. Simpson's forceps was applied in the

left oblique diameter of the pelvis, and the chin raised as much as possible until the long diameter of the face was in the transverse diameter of the pelvis. The forceps was then removed and reapplied in the right oblique diameter. The chin slowly rotated to the front, but scarcely sufficiently for delivery. Simpson's forceps was then laid aside, and those of Lazariewitsch applied in the right oblique diameter, bringing the chin to the front and resulting in the birth of the child. Slight swelling was seen on the forehead and cheeks of the child. The posterior vaginal wall was injured, and also the left labium. The patient was discharged in good condition on the twelfth day. The child died six hours after birth.

The second case was that of a primipara with brow presentation, the small fontanelle upon the left side near the junction of the ilium and pubes and the head in the pelvis. The lower uterine segment became greatly distended the patient's pulse became rapid, and exhaustion threatened. It was determined to try Lange's method of applying the forceps in the same oblique diameter occupied by the head. Simpson's forceps was applied without difficulty. Traction was made very slowly, the head rotating to the front, and delivery occurring with the usual mechanism of face presentation. When the chin was brought under the pubes the forceps was removed and the head brought out by manipulation. The child was asphyxiated, but soon revived. There was a large scalp tumor from pressure and paralysis of the facial nerve. The mother had slight laceration of the perineum. Mother and child made a good recovery.

Case third was also a primipara having a flattened pelvis, the chin of the child directed to the right side and posteriorly. The mother's heart action increased in rapidity, her temperature rose somewhat, and the heart sounds of the child were not so good. As the cervix was partially dilated, an effort was made to perform version, but this failed, and, the cervix dilating no further, the forceps was applied. The head then stood between the transverse and right oblique diameter in the entrance of the pelvis, the chin on the right side and posterior, the forehead on the left and anterior. The forceps was applied after Lange's method in the same oblique diameter with the head, and extraction made without special difficulty. The chin rotated to the front. The cord was wrapped three times about the neck of the child, and the child was born deeply asphyxiated, and could not be revived. The mother had a mild endometritis during the puerperal period, but was discharged convalescent on the eighth day. She had considerable laceration of the cervix.

Stroganoff believes that when the mother's condition demands prompt delivery efforts should be made in these cases to bring down the head and cause anterior rotation by the use of forceps. He recognizes the value of version, but believes that the head can be slowly and gently turned with the forceps successfully in most of these cases. He urges that as little force as possible be used in this delivery. Should efforts fail, craniotomy should be done. When the head is oblique he believes that two applications of the forceps will be usually necessary, but when the head extends transversely he believes that one will be needed. In these cases the straight forceps has a decided advantage in obtaining a better traction in the axis of the pelvis.

GYNECOLOGY.

UNDER THE CHARGE OF

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ASSISTED BY

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Artificial Sterilization.—Kocks (*Centralblatt für Gynäkologie*, 1902, No. 37) describes a method of preventing conception in women with certain chronic affections, suggested to him by the obstruction to the passage of the spermatozoa caused by a small mucous polypus in the cervix. He dissects off flaps of cervical mucous membrane, anterior and posterior to the os externum, and allows them to hang down so as to close the os, suturing the raw surfaces at their bases. These form together a sort of valve, allowing menstrual flow and secretions to escape, but opposing the entrance of spermatozoa.

Influence of the Gonococcus in Pregnancy and the Puerperium.—Fruhinshalz (*Annales de Gyn. et d'Obstétrique*, November, 1902) emphasizes the fact that the lochial discharges furnish the most favorable medium for the development of the gonococcus. In fact, it is often found for the first time after delivery, having been overlooked during pregnancy, without any possibility of fresh infection. Mixed infection is rare, as the gonococcus does not thrive in the presence of other microbes. On the other hand, gonorrhœal infection often favors the development of the streptococcus and staphylococcus.

Hence, parturient women with pre-existing gonorrhœa are exposed to the danger not only of the lighting up of the old trouble, but to the extension of the acute inflammatory process to the adnexa and peritoneal cavity.

Treatment of Cancer of the Uterus.—Pozzi (*Annales de Gyn. et d'Obstétrique*, November 1902) concludes a paper on this subject, read before the International Congress, with the following deductions: 1. The surgical treatment of uterine cancer rarely results in a permanent cure, the average period of freedom from recurrence in the most favorable cases being from four to six years. 2. Hysterectomy is not justifiable in cases in which the uterus is fixed by extension of the disease to the surrounding tissues; curettement and cauterization give the best results under these conditions. 3. The importance of involvement of the glands has been exaggerated. Recurrence nearly always takes place in the cicatrix. Extirpation of the lymph nodes can never be complete, and seems to have no influence on recurrence, therefore, the abdominal route should not be chosen with this object alone. 4. Abdominal hysterectomy is more dangerous than vaginal, and there is a greater risk of infection, hence it should be reserved for cases in which the indications are clear—large size of uterus, adhesions, narrow

vagina, etc. 5. In early cases of uterine cancer vaginal extirpation gives excellent results, while in advanced cases palliative treatment is preferable. 6. Vaginal hysterectomy is then the operation of election in cases in which the uterus is movable and there is no palpable evidence of extension of the disease to the surrounding tissues, with such exceptions as have been mentioned.

Jonnesco, in discussing this paper, takes the optimistic side of this question. He concludes that the results of the surgical treatment of uterine cancer are quite satisfactory, since life is prolonged and a radical cure is sometimes obtained. The ideal operation is one that includes complete removal of the uterus and adnexa, of the pelvic connective tissue, the vessels and lymph nodes, the iliac and lower lumbar, as well as the pelvic. This cannot be accomplished by the vaginal route, which should be reserved for partial or palliative operations. Abdominal hysterectomy should be limited to cases in which a radical operation is possible, that is, at an early stage in the disease.

Wertheim agreed with the last speaker, and reported 120 cases of complete abdominal extirpation, with a former mortality of 20 per cent., now reduced by better technique to 13 per cent. In his first series, in which over two and one-half years had elapsed since the operation, 77 per cent. of the patients were cured, as compared with 56 per cent. reported by Chrobak after vaginal hysterectomy. Careful examination of the extirpated glands in 80 cases showed that these were cancerous in 48, which fully justified radical extirpation.

The majority of the speakers favored the radical operation.

Herpes of the Larynx during Menstruation.—BETTMANN (*Berliner klin. Wochenschrift*, 1902, No. 36) reports a case in which an herpetic eruption on the laryngeal mucous membrane appeared only during the menstrual period. Herpes of the lips or external genitals is most commonly observed, though this menstrual eruption has been rarely seen on the hands, neck, or lumbar region, or even on the breast. Isolated cases have been reported in which vesicles appeared on the portio vaginalis or vaginal mucosa. The cause of this phenomenon in unknown, but it is probably of reflex nervous origin.

Uterus Duplex Separatus.—PANER (*Centralblatt für Gynäkologie*, 1902, No. 25) reports the case of a girl, aged eighteen years, who was operated upon for supposed tumor of the left ovary, accompanied by severe local pain and dysmenorrhœa. On opening the abdomen the enlargement was found to be a hæmatosalpinx attached to a rudimentary uterus which was distended with blood. There was no communication with the cervix. It was extirpated, the normal uterus and right adnexa being preserved. The patient made a good recovery and menstruated without pain ten days after the operation.

Malignant Folliculoma of the Ovary.—GOTTSCHALK reported to the Berlin Medical Society (*La Gynécologie*, 1902, No. 4) a case of tumor of the ovary the size of the fist, which presented considerable interest. It was of firm consistence, and was surrounded by a capsule which represented the

tunica albuginea. On section a cortical and a medullary zone could be distinguished, the former containing small cysts, the latter being solid.

Microscopically the growth showed a stroma of hyaline tissue with numerous hemorrhagic foci. The cells in the parenchyma were multinucleated and were arranged in groups without capsules, often as the lining epithelium of small cysts. The tumor resembled an aberrant thyroid. The reporter believed that the epithelial elements developed from the primordial follicles.

Pulmonary Embolism Following Hysterectomy.—PICHEVIN (*Semaine Gynécologique*, June 17, 1902) collected 586 cases of hysterectomy for uterine fibroid, with a total mortality from pulmonary embolism of 2 per cent. Vaginal hysterectomy for the same condition was attended with a mortality of 3.35 per cent. from embolism, and myomectomy with one of 12 per cent.

The writer believes that the veins may be thrombotic before as well as after operation.

Death may occur suddenly on the third day after operation, though in one instance it took place on the twenty-sixth day. It is usually unexpected, and is often unattended with any elevation of temperature.

Phlegmasia, though not a positive contra-indication to operation, renders it more dangerous.

Parotitis after Ovariotomy.—PICHEVIN (*Semaine Gynécologique*, June 17, 1902) points out the fact that this complication was regularly noted by the older writers in from 2 to 10 per cent. of their cases. It has become quite rare since the introduction of modern aseptic technique. Parotitis may be due either to the extension of inflammtion from the mouth along the duct of Steno, or it may represent a local manifestation of a general infection, the latter being more probable. Parotitis prolongs the convalescence, and may result fatally. The use of an antiseptic mouth-wash, preferably a solution of chloral, is recommended.

Turpentine in Metrorrhagia.—LIENEVITCH (*Meditz. Obozreiné; La Gynécologie*, August, 1902) has used this drug for several years in cases of uterine hemorrhage, with satisfactory results. Having dilated the cervical canal, if necessary, he introduces into the uterine cavity a strip of gauze soaked in purified turpentine. It is left *in situ* for six or eight hours, being removed if the pain becomes severe. No ill effects have been observed.

The writer has found this treatment best adapted to cases of interstitial fibroid, climacteric hemorrhage, and to those in which metrorrhagia recurs after curettement.

After-effects of Supravaginal Amputation for Fibroid.—THOMAS (*Lancet*, 1902, No. 5) reports the result of his observations in the cases of 101 patients who were kept under observation for five years after operation. All the patients were benefited. No tendency to mental aberration was noted, though in a few instances there was slight loss of memory. There were no disturbances of the bladder or bowels, nor any after-pains. As a rule sexual feelings were preserved. The writer's experience has confirmed his belief as to the importance of preserving one ovary after removal of the uterus.

Ovarian Tumors Complicating Pregnancy.—PÜRCKHAUER (*Inaugural Dis.; Abstract in Centralblatt für Gynäkologie*, 1902, No. 32) analyzes reports of twelve cases from Hofmeier's clinic, with the following conclusions: An ovarian tumor complicating pregnancy must be regarded as an ever-present danger for both mother and child. 2. Ovariotomy is always indicated, and the prognosis is good even if peritonitis has already developed. 3. Abdominal section should be performed at once if a cyst ruptures during labor. 4. If for any reason ovariotomy is contraindicated during pregnancy, it should be performed as soon as possible after delivery.

Retro-peritoneal Lipoma and Uterine Fibroid.—ULLMAN (*Hygeia; Centralblatt für Gynäkologie*, 1902, No. 15) reports the case of a patient, aged forty-six years, who had an abdominal tumor of seven years' standing. On palpation obscure fluctuation was noted. After opening the abdomen an enormous retroperitoneal lipoma was found (eleven pounds), which was removed in fragments, adhesions in the neighborhood of the right kidney being separated with difficulty. It seemed that the growth had developed from the perinephritic fat. Hemorrhage was moderate. A uterine fibroid, the size of the fist, which had undergone calcareous degeneration, was not disturbed.

Ethyl Chloride in the Treatment of Incurable Cancer.—BRAMON (*Arch. de Méd. et de Chir. Spec.; La Gynäkologie*, April 15, 1902) speaks highly of the following method of treating inoperable cancer of the uterus and vagina, adopted by Horwitz: A few days after curettement and tamponade with gauze the spray is applied to the diseased surface for from one to five minutes, or until it has been blanched several times. The treatment is repeated in three days, and is continued subsequently at longer intervals. Healthy granulations form, and in time new epithelium develops. The patient's general condition improves and menstruation becomes normal. The writer has observed that under this treatment a uterus which had previously been fixed may become movable, probably due to the absorption of inflammatory exudate.

Ligation of Internal Iliac and Ovarian Arteries in Cancer of the Uterus.—KRÖNIG (*Centralblatt für Gynäkologie*, 1902, No. 41) recommends this operation in inoperable cancer of the uterus, and reports three successful cases. The operation can be done quickly, with no loss of blood, and the convalescence is rapid.

He ligates both internal iliacs at their origin with silk, and ovarian arteries at their points of entrance into the broad ligaments. In order to prevent the formation of a collateral circulation the round ligaments should also be tied. A transverse abdominal incision may be made midway between the symphysis and the umbilicus.

In the three cases reported the hemorrhages were promptly checked, but in five discharges were only temporarily lessened. The writer believes that this operation is indicated in all cases in which after opening the abdomen radical extirpation of the cancerous uterus is contraindicated, since there is no added risk.

OPHTHALMOLOGY.

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Etiology of Myopia.—PROF. WIDMARK, Stockholm (*British Medical Journal*, November 1, 1902), criticises the commonly accepted view that convergence is the most important factor in the origin of myopia. His criticism of the theory of convergence is based upon the following thesis, which he thinks his observations warrant: If by any cause the sight of the one eye is weakened in early childhood, myopia is developed exclusively or principally in the other (strong) eye, whether the first-named takes part in fixation or passes on to convergent or divergent strabismus. If one of the eyes is lost a typical myopia may be developed in the remaining eye. He thinks the chief cause of myopia is "seeing" in a limited sense—*i. e.*, perception in the retina, particularly in the yellow spot and the processes connected therewith at the posterior pole of the eye. Whatever these processes may be, the effort of discerning objects quickly following each other, as in reading or writing, might lead to hyperæmia, which may become a predisposing cause of the myopic changes at the posterior pole. Based upon this view, myopia is to be prevented only by facilitating the work of the retina. Correcting glasses are the most useful means at our command, not by lessening the pressure of the muscles of the eyeball on any of the vertex veins, or by lessening the strain on the optic nerve at the posterior pole, but chiefly by facilitating binocular fixation, and thus contributing to a clear image of the fixed object at the fovea. Moreover, correcting glasses improve the position of the body during near work and increase the distance for accommodation.

The Course of the Fibres in the Optic Nerve as Shown by Their Degeneration after Experimental Lesions of the Retina.—PARSONS, London (*British Medical Journal*, November, 1902), produced in the retinæ of monkeys lesions with a Graefe knife, 1 to 3 mm. long, transverse to the general direction of the nerve fibres, in different quadrants of the retina. Two to three weeks later the animals were killed; the eyes, optic nerves, and brain were prepared and examined, with the following results:

1. The degenerated fibres in the main retain the same position along the whole course of the nerve; that is, the nasal fibres keep to the inner side of the nerve, and the temporal to the outer side. There are usually some outlying fibres degenerated, probably due to the operative disturbance of the vitreous.

2. There are invariably some degenerated fibres in the optic nerve of the opposite side. This result confirms the previous experiments of Pick, and of Dean and Usher on the rabbit by the ordinary Marchi method. These fibres tend to occupy the homonymous side of the opposite nerve. They are probably collaterals of the fibres in the nerve of the injured side, and are, perhaps, distributed to physiologically corresponding parts of the opposite retina.

3. The fibres from the macular region pass from the temporal side of the nerve anteriorly toward the centre as they pass back.

4. In all cases there is degeneration in both optic tracts. The degeneration in the opposite tract in temporal lesions is slight, but definite. As far as the method is capable of showing it consists of fine fibres, probably collaterals of the fibres in the nerve of the injured side.

5. The fibres spread out as they pass back in the tracts, and are distributed over their whole area posteriorly. Most go to the external geniculate body, some to the optic thalamus, and a few to the superior corpus quadrigeminum.

6. In many cases there was apparent degeneration among the fibres of the roots of the third and fourth nerves. These were probably fatty globules in lymph channels, as in some of Marchi's early experiments, and not true degenerations.

The Immediate Treatment of Wounds of the Eye.—SNELL (*Quarterly Medical Journal*, May, 1902) remarks upon the importance of prompt treatment of wounds of the eyeball and lids. The importance of early treatment is especially shown in wounds implicating the edges of the eyelids. Neglect may result in more or less deformity. When the eyeball is wounded thorough cleansing of the outside, as well as the inside, with sublimate or other antiseptic solution is essential. A simple and efficient irrigator is a pledget of cotton-wool saturated with the solution. Sympathetic ophthalmia seems to be less frequent in recent years than formerly; this happy result may be justly ascribed to the use of antiseptics and the immediate treatment of injuries.

Clean-cut wounds of the cornea usually heal readily if the iris is not engaged therein. The more important cases are those in which the iris has become prolapsed or entangled. These require immediate treatment. The method formerly in vogue was to leave the prolapse alone, but this means frequently a protracted recovery at the best, and not infrequently, unfortunate results ensue, even at a remote period. Among these may be mentioned recurring irritability of the eye, with gradual loss of any vision at first recovered, increased tension (secondary glaucoma), and sympathetic mischief in the fellow eye, especially if the injury has involved the ciliary region. The attempt should be made to replace the prolapsed iris or to clear the wound of any entangled portion by means of a spatula. If this proves ineffectual, as it often will, the prolapsed portion should be incised. It is more difficult to remove a part of the iris when it is merely entangled in the wound. It is often necessary to excise a portion, first from one lip of the wound and then from the other. Following this atropine is usually better than eserine, unless the wound be toward the periphery. It is especially

important to remove a part of the prolapsed or entangled iris if the wound encroaches on the ciliary region. In wounds of the sclera the writer advocates suturing the conjunctiva over it. The sclerotic wound becomes thus a subcutaneous one. If a foreign body is lodged in the eye or a traumatic cataract has been produced treatment in the first instance must have regard to those conditions.

The Cortical Centres of Vision as Demonstrated after Enucleation or Atrophy of the Eyeball.—GALLEMAERTS (*Bull. de l'Acad. Royal de Méd. de Belgique*, vol. xvi., No. 4) formulates the following conclusions: 1. After enucleation or atrophy of one eyeball the fact that partial decussation of the nerves takes place is demonstrated by atrophy of certain cells in both occipital lobes. 2. This cellular atrophy is more pronounced on the side opposite that of the missing eyeball. 3. The atrophy is especially limited to the region of the calcarine fissure, the lingual lobe, and cuneus, involving these parts to an extent varying in different subjects. 4. The visual zone is limited to the region of the calcarine fissure, the lingual lobe, and the cuneus. It occupies neither the descending gyrus nor the fusiform lobe, and still less the angular gyrus. 5. All the cellular layers of the visual zone participate after the lapse of a certain time in the atrophy. 6. The ribbon of Gennari or Vicq d'Azyr cannot be considered as an exclusively optic region.

Treatment of Ophthalmia Neonatorum.—FROMAGET (*Journal de Méd. de Bordeaux*, 1902, No. xix.) observes that this disease with the vague and inexact name may be caused by the streptococcus, the pneumococcus, and many other species of microbes, but the gonococcus is the commonest and most dangerous. This ophthalmia is at first a purulent conjunctivitis. The cornea is never primarily diseased, but only as a complication. This complication does not occur in skilled hands when the disease is treated from the beginning. When the cornea does become involved the worst results are to be feared. Every case properly treated from the beginning should recover without corneal involvement.

[This statement is rather too sweeping. It unfortunately occurs, though happily rarely, that the cornea does become involved in spite of prompt and proper treatment.—ED.]

There are two indications for the physician and midwife: 1. Prophylaxis. 2. Efficient treatment from the beginning. As regards prophylaxis, the principal obstacle is the obstinacy of many midwives and even physicians in refusing to recognize the danger. They consider the reddening eyes to be "only a cold" which will get well of itself. A terrible catastrophe is necessary to drive the lesson home.

In the treatment nitrate of silver is sometimes abused. This agent is not only an antiseptic, but also a caustic. Strong solutions frequently repeated may injure the corneal epithelium. The whole treatment is directed against this very thing. By all means avoid every injury of the corneal epithelium. It is surprising to observe the resistance which the epithelium of the cornea offers to the infection; how, though bathed in pus, it preserves its precious lustre, which seems to defy the attacks of the disease; but let there occur

the slightest solution of continuity, the smallest chemical or physical wound, and the infection invades the transparent membrane whose protecting cuirass is broken. An essential part of the treatment consists in ridding the conjunctival sac of pus. The pus adherent to the lids is first washed off, and the retained pus is expelled by gently opening and closing the lids. This constitutes the external toilet, which can be done by anyone. It is to be followed by lavage of the conjunctiva, a therapeutic measure of prime importance. Permanganate of potash in 1 per cent. solution, subsequently reduced to 0.50 or 0.25 in boiled or borated water, is as good as any medicament for the purpose. This solution is neither irritating nor painful, like formalin or sublimate, and its germicidal quality is well known. It does not injure the cornea. The discoloration of the skin caused by it can be removed by solution of bisulphide of soda, 10 or 20 per cent. To properly irrigate the conjunctival sac the lids must be separated by the hands if the œdema is not too great. The child's head must be immobilized; one or two assistants may be necessary. If the lids cannot be properly separated by the fingers, lid retractors should be used, so that the whole conjunctiva may be given an antiseptic bath. Sterilized tampons of absorbent cotton are dipped in the warm solution and squeezed, so that the liquid flows over the whole sac. Rubber bulbs and syringes may also be used, but with these great care is necessary to prevent splashing into the attendant's eye. There is no such danger with the tampon. If retractors are used they should only be employed by an experienced hand, otherwise the corneal epithelium may be scraped. How abundant should these washings be? Should litres be poured over the conjunctiva? Not at all. When the sac has been thoroughly cleansed of pus and the liquid flows out clean, more is useless and may be dangerous from positive injury of the cornea by the instruments. After the conjunctival baths the lids are to be carefully turned back and the swollen conjunctiva lightly sponged with warm tampons to remove the false membranes which result from the coagulation of purulent masses. The washings should be made each time before the child nurses. After-improvement begins every four or five hours, subsequently at longer intervals. These irrigations are very important, and certain benign cases are greatly improved thereby, but they cannot assure recovery alone.

An agent capable of affecting the pathogenic microbes, even when in the epithelial cells, is to be brought upon the surface of the palpebral and ocular conjunctiva. This agent is nitrate of silver. Many oculists recommend its employment in strong solutions—2 and 3 per cent. Precaution must be taken to avoid injuring the cornea by the caustic. A solution of chloride of sodium should be used to thoroughly neutralize any excess of silver. If so used the conjunctiva is cleansed as above described, the upper lid being completely everted is painted with the silver, the lower remaining in position to protect the cornea. The upper lid is to be turned back before proceeding to cauterize the lower; but this plan has one element of danger, namely, the risk of injuring the cornea, notwithstanding every precaution. The writer, therefore, recommends cauterization by means of the solid stick. This only reaches the spots intended. It dissolves slowly enough, so that it can be quickly neutralized. The cauterizations are to be repeated daily until the subsidence of the inflammation, as shown by the diminution of the

œdema and the ability of the child to open its eyes. As the stick cannot reach the cul-de-sac and deep folds, the cauterization is to be followed by a large instillation of a 1 per cent. solution of nitrate of silver, seven or eight drops. This is free from danger, and can be used by any physician or capable nurse. In cases treated from the start and all mild ones such instillations repeated twice daily suffice without the use of the stick. When the child for any reason cannot be seen by the physician, weak solutions, 0.01 to 0.05 per cent., can be used by the nurse three times a day, following irrigation with permanganate. The stick is to be reserved for severe cases with great œdema and profuse suppuration.

The crux of the treatment is the irrigation. The difficulty is to have this properly performed. Efficiency without violence is the secret. When the pus has disappeared the silver may be replaced by astringent collyria of sulphate of zinc. The strength of the permanganate is to be reduced and finally replaced by borate of soda in solution. The eye should never be bandaged. The outflow of pus is to be favored and not restrained. The margins of the lids may be oiled with an ointment of simple vaseline or yellow oxide of mercury or aristol. Iodoform is to be avoided, being frequently an irritant.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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On the Pathological Changes in Hodgkin's Disease, with Special Reference to its Relation to Tuberculosis.—Dr. Dorothy M. Reed (*Johns Hopkins Hospital Reports*, 1902, Nos. 3, 4, and 5, vol. x. p. 133) states that since Hodgkin first described, in 1832, the peculiar enlargement of the lymphatic glands, the exact nature of the pathologcal changes in the glands and the cause of their lesions has been the subject of much discussion. At various times the disease has received different synonyms. Progressive multiple gland hyperplasia (Wünderlich, 1858), lymphosarcoma (Virchow, 1864), pseudoleukæmia (Cohnheim, 1865), adenia (Trousseau, 1865), and malignant lymphoma (Billroth) have all been used to designate this affection. Delafield, in 1887, reported a case of primary tuberculosis of the lymph glands simulating pseudoleukæmia, and other authors have made similar observations. Sternberg found tuberculosis in eight out of thirteen autopsy cases

of Hodgkin's disease, and concluded that the lesions in the glands were due to a peculiar tuberculous process. Clarke finds no warrant for the assumption that the process is a tuberculous one.

Two etiological possibilities have heretofore been considered, viz., that of a malignant growth and that of an infectious process. So far the bacteriological findings have been entirely unsatisfactory, but although the histological changes resemble somewhat those of a new-growth, the author believes that further investigation will show a great similarity to inflammatory processes. Tuberculosis has been considered the cause of Hodgkin's disease by several observers. With this view the author entirely disagrees, for although tuberculosis may exist at the same time with Hodgkin's disease, the two processes are totally distinct. In most of the cases when both affections coexist, tuberculosis appears as a secondary process.

Clinically the disease can be easily recognized. It occurs oftenest in early life, and much more frequently in males than in females. A tuberculous family history is not found in an unusual percentage of cases. Throat trouble and inflammation of the eye or ear often precede the growth. The one constant feature is a progressive enlargement of the lymphatic glands, usually beginning in the cervical nodes, and being at first unilateral. The single large glands can often be mapped out, and involvement of the skin or adjacent tissues rarely occurs unless there is secondary infection. Progressive asthenia, anæmia, and cachexia supervene. Other than the anæmia there are no specific blood changes. Irregular or continuous fever is the rule. Enlargement of the spleen is always present, and it may be enormous. The liver is less often enlarged. Pressure symptoms are common. The majority of cases last from one to four years, but the process may be of an acute nature.

No therapeutic measure is known which influences the course of the disease, and after extirpation of the glands recurrence is the rule.

The author reports eight cases of Hodgkin's disease, seven of which were in boys under seventeen years of age and one in a woman, aged fifty-five years. The duration of the growth varied from two to seventeen years. In all the cases there was anæmia, but otherwise the blood changes were not remarkable. All of the cases showed a slight, irregular fever, with occasional exacerbations. Tuberculin was given in five cases, but without reaction. Complete excision of the tumor mass was performed in five cases. In three cases the material was obtained from autopsies. In one of these cases there was generalized miliary tuberculosis; in the other two there was no sign of tuberculosis, and no tubercle bacilli could be demonstrated in sections from the glands. Macroscopically, the glands are discrete, and on section appear uniformly semitranslucent gray or broken by yellow streaks. The so-called metastatic nodules may appear in any organ where lymphoid tissue is found normally.

Microscopically, the earliest change in the lymph glands was an increase in the lymphoid elements, with beginning proliferation of the reticular endothelial cells. Later, the process was characterized by an extensive proliferation of the endothelial cells, from which large numbers of giant cells were formed, and the production of connective tissue, so that in the older glands the normal structure was completely destroyed. Usually eosino-

philes were present in large numbers, and plasma cells, "kugelzellen," endothelial phagocytic cells, and mast cells were also seen.

In the metastatic nodules the same series of changes take place, with the production of connective tissue and the presence of the different cells found in the lymph glands.

The conclusions are:

1. We should limit Hodgkin's disease to designate a clinical and pathological entity, the main features of which are painless progressive enlargement, usually starting in the cervical region, without the blood changes of leukæmia.

2. The growth presents a specific histological picture—not a simple hyperplasia, but changes suggesting a chronic inflammatory process.

3. The microscopic examination is sufficient for the diagnosis. Animal inoculation may confirm the decision by its negative results.

4. Eosinophiles are usually present in great numbers in such growths, but not invariably. Their presence strengthens the diagnosis.

5. The pathological agent is as yet undiscovered. Tuberculosis has no relation to the subject.—W. T. L.

Report on Diphtheria Bacilli in Well Persons (*Journal of the Massachusetts Association of Boards of Health*, July, 1902, by a committee of the Board working in co-operation with a number of recognized experts).—In all 4250 healthy individuals were examined in various parts of the United States, and it was found that in nearly 3 per cent. of these persons true diphtheria bacilli were found, using as a basis of judgment the three types of B. diphtheriæ described by Wesbrook. As tested on guinea-pigs, about 17 per cent. of these true forms were found to be virulent. In healthy persons who have the B. diphtheriæ as a result of exposure to the disease the percentage of virulent forms is much higher, and in such cases the persons, although themselves immune, should be regarded as fully as dangerous to the public health as convalescents from the disease. It is concluded that it is impracticable to isolate well persons infested with diphtheria bacilli if such persons have not been recently exposed to the disease; and, furthermore, it is not advisable, as a matter of routine, to isolate from the public all the well persons in infected families, schools, and institutions.

On the Cultivation of the Virus of Variola.—T. ISHIGAMI (*Sei-I Kwai Medical Journal*, Tokyo, 1902, vol. xxi., Nos. 4 and 5) has been able further to identify the protozoon described by Guarnieri as the cause of vaccinia and variola, and also to cultivate this organism on a bouillon medium containing the epithelial cells of normal calves. That this is the true etiological factor in variola he has shown by reproduction of the characteristic lesions in calves by inoculations with cultures transplanted as far as the third generation. The protozoon resembles in its life cycle the microsporidia. It occurs in variola lymph, in scabs, and in the epithelial cells of the inoculated calf, in the form of sporozoites, which, under favorable circumstances in the animal, develop by direct division into cysts. In culture media the growth is less rapid, and the power to reproduce the specific lesions is lost at the third transplantation.—F. P. G.

On the Sensibilizers of Sera Active against Albuminoid Substances.—GENGOU (*Annales Pasteur*, 1902, vol. xvi. p. 734) shows that the blood sera of animals immunized with cow's milk, egg-albumin, pure fibrinogen, and heated serum possess, in addition to the precipitins, which have already been described, substances analogous to the "substances sensibilisatrices" (amboceptors), which have been so much studied in the hæmolytic and bacteriolytic sera. The presence of such sensibilizing substances may be detected by their power to absorb alexins (complements) from normal sera, as is shown by the inability of such mixtures subsequently to complete the hæmolysis of sensibilized hen's red blood corpuscles. These experiments presuppose and would seem further to confirm Bordet's theory of unity of the alexin. Such albuminous sensibilizing bodies are further shown to be non-specific within certain limits, as is the case with the precipitins.—F. P. G.

The Pathology of Lymphotoxic and Myelotoxic Intoxication.—FLEXNER (*University of Pennsylvania Medical Bulletin*, 1902, vol. xv. p. 287) describes the histological changes in the blood-forming organs of the rabbit and guinea-pig when inoculated with the blood of animals previously treated with sterile emulsions of one set of these organs (lymph nodes, spleen, or bone-marrow). Funck has already noted the effect on the various forms of white blood corpuscles *in vitro* and *in vivo* when treated with lymphotoxic, myelotoxic, and splenotoxic sera obtained by immunization of another species of animal with the substance of the different blood-forming organs; but hitherto no one has described the effect produced by such sera on the organs against which the foreign animals have been immunized. Lymphotoxins, splenotoxins, and myelotoxins are found to produce a most marked effect on their respective organs, but this activity is not entirely specific, as the other sets of blood-forming organs are also affected. In brief, the changes noted are, in the case of the lymph nodes, enlargement due to hyperplasia of the germinal nodes; in the spleen, enlargement through hyperplasia of the Malpighian bodies; and in the bone-marrow an enormous increase of the white blood elements. The three toxins are distinct and different in their action, and the myelotoxin possesses a far more active effect on the non-specific organs.

This community of interaction would indicate, it appears, the existence of common receptors in all the blood-forming organs, and further investigations along this line promise to reveal a more definite basis for the understanding of the origin of the formed elements of the blood.—F. P. G.

On the Actinomyces-like Development of Some of the Acid-resisting Bacilli (Streptothrices?).—A. C. ABBOTT and N. GILDERSLEEVE (*Centralblatt für Bacteriologie*, 1902, No. 12, Band xxxi. p. 547), experimenting with the grass bacillus II. (Moeller), the timothy hay bacillus (Moeller), and the butter bacillus (Rabinowitsch), found that after intravenous inoculations of the organisms small nodules developed in the kidneys of the inoculated animals. This occurred at the end of twelve to fifteen days, at which time the animals were killed. The lungs were rarely affected. Histologically, these nodules closely resembled tubercles, and the author's findings practi-

cally coincided with those of Hoelscher. From these areas were recovered the acid-proof bacilli injected. Certain bodies unstained by ordinary histological methods appeared in the lesions, which, on account of their rosette-like shape, suggested the structure of a mycelium. Stained by the method of Gram or Babes and Leoarditi, they were readily recognized as mycelia, strikingly like actinomyces. The typical actinomyces mode of growth was common, but beaded threads were also found closely matted together and grouped like bacillus tuberculosis grown upon artificial media. A study of this mycelial development suggested that the original bacilli were really segments of the beaded mycelial threads. Small coccus-like bodies were found about the mycelia and often extended into the surrounding tissues. These were taken to be sections of hyphæ.

Comparing the distinguishing staining reactions of this group of saprophytes with those of bacillus tuberculosis; comparing the various morphological peculiarities exhibited by some of them with those now known to occur during the life of bacillus tuberculosis—notably branching, mycelial development under artificial conditions, and actinomyces-like growth in diseased tissues—and considering the fact that one of the results of the pathogenic actions of all is the production of nodular new-growths having often many features in common, the authors regard them as botanically closely allied and as morphologically improperly classified. They therefore suggest that they be grouped with the actinomyces or the streptothrices, in conformity with the suggestions made by others concerning bacillus tuberculosis.—W. T. L.

On the Bacteriological Findings in an Epidemic of Dysentery in Southern Syria.—P. T. MÜLLER (*Centralblatt für Bacteriologie*, Abt. 1, Band xxxi., S. 558) reports his findings in a few cases at the end of a dysentery epidemic in this locality. He regards it as distinctly proved by the researches of Shiga, Flexner, Kruse, and Vedder and Duval that epidemic dysenteries in general are universally caused by a specific micro-organism, the B. dysenteriæ—an organism which, however, may possess slight cultural variations in different localities. Müller himself isolated an organism varying in no particular culturally from the B. dysenteriæ as described by the authors mentioned. Guinea-pigs and rabbits inoculated with this bacillus, and others with the organism of Kruse, showed interagglutinations, still further demonstrating the unity of the species.—F. P. G.

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